Managerial Optimism and Corporate Financial Policies

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Preface

An introductory summary

Since decades, research in corporate finance tries to explain company activities. The traditional approach thereby assumes individuals to be risk-averse characters that are equipped with perfect information and that act to maximize their own utility. Quite often, however, observed behavioral patterns are inconsistent with these assumptions.[1] Another perspective offers the field of behavioral finance. This field combines neoclassical economic theory with insights from psychology and neuroscience in order to describe why individuals, firms, and markets as a whole consistently deviate from what traditional finance would describe as *rational* or *efficient*. Individuals are no longer seen as rational utility-maximizers but instead often have emotional or cognitive biases that prevent them from drawing correct inferences from the available information.

This thesis aims to describe various corporate financial policy decisions using a behavioral finance perspective. It consists of three essays that empirically investigate to what extent managerial traits affect company activities such as risk-taking or financial reporting and describes their effects on the firms' stakeholders. The managerial trait that is subject of these studies is *managerial optimism*. This behavioral bias describes agents (managers), who believe to act in the principals' (shareholders') best interest but in fact have upwardly biased views about their own abilities and consequently about the performance of their firms.[2] Early research on overoptimism emanates from the psychology field. When individuals are asked to assess their relative skills,

[1] See for example Barberis and Thaler (2003) and Baker and Wurgler (2013) for an overview.

[2] In the following, the terms *overly optimistic* and *optimistic* are used interchangeably. They both refer to a situation where mangers overestimate their abilities and consequently the performance of their firms.

they tend to overestimate their own abilities (Larwood and Whittaker (1977), Svenson (1981)). This so-called "better-than-average" effect thereby seems to be especially pronounced for corporate executives as their performance is hard to evaluate, they are strongly committed to their work, and perceive to have control over their companies' performance.[3]

Recent evidence in finance and accounting suggests an important impact of managerial optimism on corporate financial policies such as corporate investment, capital structure, mergers and acquisitions as well as on financial reporting.[4] Empirically, the task is to identify which managers are rational and which are overly optimistic. We follow Malmendier and Tate (2005) and classify managers as optimistic based on their executive stock option trading behavior. Thereby executives are classified as optimistic when they hold company stock options until the final maturity year even though the options are already deep in the money. From a diversification point of view, this behavior is considered irrational and implies that managers have an upwardly biased view on the firm's performance. The classification requires information on executive stock option holding for key company executives, i.e., for company executives that drive corporate financial policy decisions. For this purpose, the ExecuComp database, which contains information on executive compensation for large U.S. firms, is used in combination with an algorithm for stock option exercises in order to construct annual portfolios of option holdings for the Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs) of more than 3,000 large U.S. firms.[5] To the best of our knowledge, we are the first to replicate the measure by Malmendier and Tate (2005), which is based

[3] See Larwood and Whittaker (1977), Kidd (1970), and Moore (1977) for examples on the pronounced optimism bias among corporate executives. March and Shapira (1987), Gilson (1989), and Langer (1975) show that executives believe to have control over and are strongly committed to their firms' performance.

[4] See for example Malmendier and Tate (2005), Malmendier and Tate (2008), Malmendier, Tate, and Yan (2011), Schrand and Zechman (2012), and Hribar and Yang (2013).

[5] The sample consists of firms that were constituents of the S&P 1,500 index between 1993 and 2010 and thereby focuses on large firms. For details concerning the optimism classification procedure see General Appendix A.

on proprietary data, with publicly available information.[6] The following section briefly describes the empirical design and findings of the three essays on managerial optimism that are the subject of this thesis.

The first paper (joint work with Tim R. Adam, Valentin Burg, and Daniel Streitz) studies the impact of managerial optimism on debt contract design. In particular, the focus is on performance-sensitive debt contracts (PSD), i.e., debt contracts with coupon payments that deterministically follow an underlying measure of borrower quality. Thus, if borrower quality decreases (increases), coupon rates are increased (reduced) to pre-agreed levels. The increased risk (benefit) of higher (lower) future coupon payments is reflected in a lower (higher) initial spread paid by the borrower. Based on a signaling model by Manso, Strulovici, and Tchistyi (2010), according to which high quality borrowers select PSD contracts and low quality borrowers select straight debt contracts, we argue that firms with overly optimistic managers are more likely to issue PSD contracts than their rational counterparts. As optimistic managers have an upwardly biased view on their firms' future cash flows, they overestimate the credit quality of their firms and consequently pool with higher quality borrowers in order to get better funding terms.[7]

The Manso et al. (2010) model considers only two types of firms, high quality and low quality firms. However, extending the model to a continuum of credit quality does not affect the separating equilibrium as PSD contracts with different degrees of priced risk, i.e., different pricing grids, could still be used as a screening device. Consider for example a case with three types of

[6] By using this procedure, the sample size could be more than tripled compared to the Malmendier and Tate (2005) sample.

[7] Manso et al. (2010) argue that PSD can be used as a screening device to separate high quality borrowers from low quality borrowers. High quality borrowers prefer PSD contracts as these contracts offer a lower initial coupon rate than straight debt contracts, and because their credit quality does not trigger interest rate increases in the future. Low quality borrower on the contrary cannot mimic high quality borrowers as they would face higher coupon rates in the future and consequently larger borrowing costs compared to straight debt. Consequently, low quality borrowers prefer to issue straight debt.

borrowers: high quality, medium quality, and low quality. In this situation, low quality borrowers would select contracts with no (or little) interest increase potential, medium quality borrowers select contracts with some interest increase potential, and high quality borrowers select contracts with great interest increase potential. The better the credit quality of the borrowers, the less likely they face higher coupon rates in the future and consequently the more risk-compensation they could sell to lenders. Conditional on choosing PSD, optimistic managers therefore choose more risky contracts than rational managers on average. In the example with three types of borrowers, some medium quality firms with overly optimistic managers pool with high quality firms and consequently choose riskier contracts on average.

Our empirical evidence confirms these hypotheses. Firms with optimistic managers are indeed more likely to choose debt contracts with performance pricing features and they choose PSD contracts that contain more risk-compensation than rational managers. Consistent with an overestimation of credit quality, we furthermore find that firms with optimistic managers are significantly more likely to experience a performance deterioration, i.e., credit quality decreases, after the loan issue than firms with rational managers. This finding also rules out that optimistic managers have positive inside information rather than upwardly biased beliefs on their firms credit quality. Overall, our findings show that managerial optimism is an important determinant in a firm's debt contracting policy and directly impacts the chosen instrument and its risk features.

The second paper deals with corporate risk management. It investigates to what extent firms that are managed by overly optimistic executives differ in their likelihood to hedge currency exposures compared to firms that are managed by rational executives. In particular, this study first identifies firms that have a notable foreign exchange (FX) rate risk exposure and then investigates

which of these firms use financial derivatives to mitigate their currency risk and which firms leave their exposures unhedged.

Theoretically, managerial optimism could be associated with a lower or with a higher likelihood to hedge. For the first channel consider the reduction of financial distress costs as a classical argument for corporate risk management. Hedging allows to shift cash flows from good to bad states and consequently lowers the probability and cost of financial distress (Smith and Stulz (1985)). An optimistic manager has an upwardly biased view on the future firm performance and consequently underestimates the distress likelihood and/or underestimates the accompanied distress costs. Consequently, optimistic managers assign a lower value to the benefits of hedging and are therefore less likely to reduce their risk exposures. Alternatively, managerial optimism might have a positive effect on the decision to hedge. This channel is based on the pecking-order theory of capital structure (Myers and Majluf (1984)). External funds are more costly than internal funds, due to information asymmetries between corporate insiders and external capital providers. Thus, firms generally prefer internal funds to finance their investment projects. As hedging allows to shift internal funds from states when they are abundant to states when they are scarce, it avoids situations where costly external capital needs to be raised to finance investment projects. As shown by Malmendier et al. (2011), optimistic managers generally view external funds as especially costly since they believe that current market prices do not adequately reflect the value of their companies. Consequently, optimistic managers have an even stronger aversion to tap external capital markets and are thus more likely to hedge. Thus, whereas the first channel postulates a relatively lower likelihood to hedge for optimistic managers, the latter argues for a greater likelihood to hedge. Which channel prevails is the empirical question that is subject of this study.

Empirically, this analysis is the most extensive of the three studies as corporate risk management data is not readily available. In order to gather the necessary information more than 24,000 annual reports are screened for more than 1,000 keywords indicating the use or non-use of financial derivatives for currency hedging purposes. The sample contains all non-financial firms that were constituents of the S&P 1,500 index between 1993 and 2010 for which we can classify the CEO as optimistic or rational. Having a time series of almost 20 years of derivative usage data, the study contributes to the risk management literature by documenting an general increase in the likelihood to hedge from about 40% in the early 1990's to about 60% in the late 2000's for U.S. non-financial firms.

The empirical analysis shows that firms that are managed by optimistic CEOs are significantly less likely to use financial derivatives to hedge their currency exposures. This behavior is consistent with an underestimation of financial distress costs by overly optimistic managers. Even though the finding is descriptive in nature and does not imply causality, it corroborates the need to investigate behavioral aspects in corporate financial policy analyses. Prior literature on corporate risk management generally focuses on macroeconomic conditions or observable firm characteristics.[8] The empirical evidence hereby, however, is mixed at best. Behavioral explanations seem to offer a promising new route for a deeper understanding of corporate hedging behavior.

The third study "Big Bath Accounting - The Bright Side of Managerial Optimism", which is coauthored with Valentin Burg and Jochen Pierk, has two fundamental differences compared to the first two studies. First, it does not strictly focus on empirical corporate finance but rather bridges behavioral finance with the field of empirical accounting research. It thereby adds to the new and growing literature on managerial optimism and corporate accounting

[8] See for example Aretz and Bartram (2010) for an overview.

decisions. Second, whereas the first two papers document higher risk-taking by firms with optimistic managers, a behavior which is not necessary in the stakeholders' interests, the third study documents a possible positive effect of managerial optimism by showing that optimistic managers are less likely to use large write-offs to manipulate earnings after turnover.

After a new CEO takes the helm it is frequently observed that firms engage in massive write-offs. These losses are ascribed to the outgoing CEO and the incoming CEO can take credit for subsequent performance improvements. This so called "big bath" accounting behavior is often not justified by company fundamentals but rather constitutes an earnings manipulation that is used to give the incoming CEO a head start and to facilitate the reaching of future earnings targets. Frequently, however, earnings manipulations do not stay undetected and managers and firms face serious consequences if they are revealed. Dechow, Sloan, and Sweeney (1996) and Hribar and Jenkins (2004) for example report significantly larger capital market costs after the revelation of earnings manipulations. Thus, an incoming CEO faces a trade-off between costs and benefits of big bath accounting. As overly optimistic manager have an upwardly biased view with respect to their abilities and consequently to the future performance of their firm, they place a lower value to the benefits of big bath accounting. Based on this premise, we hypothesize that firms that hire optimistic CEOs are less likely to engage in big bath accounting compared to firms that hire rational CEOs.

Empirically, the hypothesis is tested using a sample of about 400 CEO changes in large U.S. firms, for which we are able to classify the incoming CEO as rational or optimistic. We find strong support for our hypothesis. Firms that hire optimistic CEOs are about 15% less likely to engage in big bath acounting than those hiring rational CEOs. This is also economically meaningful given the average likelihood to take a big bath for incoming rational

CEOs of about 40%. This finding is one of few examples where a managerial bias, i.e., optimism, can be positive for stakeholders. To the best of our knowledge there are only two other empirical studies that document positive effects of managerial optimism. Hirshleifer, Low, and Teoh (2012) find that optimism helps to be innovative and Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) find that moderate optimism facilitates first-best investment decisions.

To summarize, managerial traits seem to have a significant impact on various corporate financial policy decisions. As managers are the ultimate decision-makers it is natural that their behavioral characteristics may shape corporate decisions. Thus, whereas the traditional finance literature generally focuses on company fundamentals and rationality to explain financial policy decisions, behavioral traits have been shown to contribute significantly to the understanding of various aspects in finance and accounting. Hereby a behavioral bias should not be deemed negative in general but should rather be seen in the context. While managerial optimism might lead to excessive risk-taking, which can be harmful for stakeholders, the third paper shows that there are certainly also situations in which it can have a positive flavor.

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Managerial Optimism and Debt Contract Design

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Abstract:

We study the impact of managerial optimism on debt contract design. In particular, we focus on the use of performance-pricing provisions in loan contracts (PSD). Building on the signaling equilibrium by Manso, Strulovici, and Tchistyi (2010), we argue that optimistic managers, who overestimate their firms' future cash flows, perceive PSD as a relatively cheap financing source. Our empirical results confirm that optimistic managers are indeed more likely to issue PSD than rational managers. Optimistic managers also choose riskier PSD contracts with more potential for spread increases and greater punishment for performance deterioration. Further, firms with optimistic managers perform worse than firms with rational managers after issuing PSD.

Keywords: Optimism; Performance-Sensitive Debt; Debt Contracting; Syndicated Loans

JEL-Classification: G02, G30, G31, G32

1 Introduction

The recent literature has shown that managerial optimism can have significant effects on a firm's financing and investment strategies. For example, Graham, Harvey, and Puri (2013) and Hackbarth (2008) argue that optimistic managers view external funds as unduly costly, which according to Heaton (2002) and Malmendier, Tate, and Yan (2011) can lead to a preference for issuing debt over equity. In this paper we show that managerial optimism affects not only the choice between debt and equity, but also certain debt design features such as performance-pricing provisions, which specify that the interest rate rises if the borrower's performance deteriorates.

Manso et al. (2010) hypothesize that this type of performance-sensitive debt (PSD) can be used to signal a firm's unobservable credit quality to potential lenders. Lenders, who cannot distinguish between high and low quality firms, offer borrowers a menu of contracts, which includes fixed-interest debt and risk-compensating PSD. High quality firms choose PSD because the initial interest payments are lower compared to fixed-rate contracts, and because their credit quality will not deteriorate and trigger future interest increases. Low quality firms, on the other hand, will not mimic high quality firms as they would face higher interest payments in the future and consequently higher borrowing costs compared to straight debt contracts. Thus, in the resulting separating equilibrium high quality firms issue PSD, while low quality firms issue straight debt.

We argue that optimistic managers, who persistently overestimate their firms' future expected cash flow, may (irrationally) decide to mimic high quality firms and issue PSD in order to benefit from the relatively low initial interest rate offered by lenders for PSD. This possibility gives rise to a number of new testable hypotheses, which we evaluate in this paper. First, optimistic man-

agers should exhibit a greater likelihood of using PSD than rational managers as they overestimate their firms' credit quality.[1] Second, extending the Manso et al. (2010) framework to a continuum of credit qualities and associated risk-compensating PSD contracts predicts that optimistic managers choose PSD contracts with a higher risk-compensation, i.e., riskier contracts with higher spread punishments for performance deteriorations, than rational managers on average. Finally, the post-issue performance of PSD issuing firms led by optimistic managers should be worse than the post-issue performance of PSD issuing firms led by rational managers.

We examine these hypotheses using a sample of syndicated and non-syndicated loan tranches issued between 1990 and 2010 obtained from the LPC Dealscan database. The terms managerial optimism and overconfidence have been used inconsistently in the literature. We define managerial optimism to mean that the executive persistently overestimates the firms' future expected cash flow. Of course, future cash flow expectations are not observable. We therefore follow the methodology discussed in Malmendier and Tate (2005) and classify CEOs as optimistic if they ever hold an option until maturity which is at least 40% in-the-money at the year-end prior to maturity (Longholder). The rationale behind this measure is that CEOs who typically have a large fraction of personal wealth tied to their companies and only limited diversification abilities across alternative investments should rationally exercise an option once it is in-the-money and exercisable. Only executives who are extremely confident about their firm's future return would decide not to exercise their stock options in these situations. In addition, we construct the Holder67, Pre-

[1] The possibility that managers overestimate their credit quality is reflected in a statement by John Bowen, CFO of Morton International Inc., commenting on a performance-sensitive debt issue in 1990. *"[...] the market was giving us a reduction in basis points on the coupon, and we felt there was no probability of violating the covenants [i.e., the performance pricing thresholds]."* During the life of this PSD, Morton International Inc. experienced several downgrades from AA to BBB. *(Investment Dealers' Digest, June 1990)*

/Post-Longholder and the optimism variable proposed by Sen and Tumarkin (2009) to test for robustness of our results.

Our results support the empirical predictions. Optimistic CEOs are six percent more likely to issue PSD than rational CEOs, which is economically significant given an overall mean of about 50%. Optimistic managers also sell more risk compensation to lenders than rational managers, i.e., their PSD contracts specify more potential for interest rate increases and greater punishment for performance deterioration. Furthermore, we find that the performance of firms with optimistic managers is more likely to deteriorate after the issuance of PSD, suggesting that the use of PSD may be harmful for these firms. This result also rules out the possibility that the managers, which we classify as optimistic, possess positive inside information about their company's future performance. If this were true, issuing PSD could be a rational choice driven by different information sets and not by differences in opinions.

A potential concern with our analysis is that a firm's choice to hire an optimistic CEO is endogenous. This decision might be correlated with the same variables that also affect the decision to issue PSD. We address this issue in two ways. First, we model the firm's choice to hire an optimistic CEO using a propensity score matching approach, i.e., we match one firm that is managed by an optimistic CEO to a firm that is equally likely to be managed by an optimistic CEO but is indeed managed by a rational CEO. Our results are qualitatively unaffected. The main drawback of this procedure is that we can only match based on observable characteristics. In a second step, we therefore control for unobservable (time-invariant) firm characteristics by testing whether the policy to issue PSD changes after CEO turnover with optimistic successors. We find that optimistic CEOs increase the issuance of PSD after being hired while incoming rational CEOs decrease the fraction of PSD issues. The difference between these two groups is highly significant.

In summary, we show that (i) optimistic managers are more likely to issue PSD than rational managers, that (ii) optimistic managers issue PSD with more risk-compensation than rational managers, and that (iii) firms managed by optimistic managers perform worse after issuing PSD than firms managed by rational managers. These results are robust to controlling for the endogenous choice of employing an optimistic manager.

We make two contributions to the literature. First, we show that managerial traits have a measurable impact on debt contract design. In particular, we document a positive relationship between managerial optimism and the inclusion of performance pricing provisions in loan contracts. This is of particular importance as debt is a major financing source, especially for companies managed by optimistic CEOs. The prior literature on managerial optimism and corporate borrowing focuses only on firms' leverage ratios (see Malmendier et al. (2011)) and debt maturity (see Landier and Thesmar (2009) and Graham et al. (2013)).

Second, we contribute to the literature on performance pricing provisions in corporate debt contracts. Specifically, we find that optimistic managers make more use of PSD contract features. The existing literature on performance pricing shows that PSD can be used as a signaling device in a setting with asymmetric information (Manso et al. (2010)). Other studies document a link between PSD and earnings management (Beatty and Weber (2003)), moral hazard costs (Asquith, Beatty, and Weber (2005)), relationship lending (Adam and Streitz (2013)), and manager equity incentives (Tchistyi, Yermack, and Yun (2011)). We are the first, who link PSD to a managerial bias.

The remainder of the paper proceeds as follows. Section 2 presents our hypotheses. Section 3 describes our sample selection process. Section 4 contains the empirical analysis of the impact of managerial optimism on PSD contract terms. In Section 5 we test the robustness of our results by using

alternative optimism measures and by including observable manager characteristics. Section 6 concludes.

2 Hypothesis Development

Performance-sensitive debt (PSD) is debt in which the interest rate is a deterministic function of the issuer's performance. Manso et al. (2010) show that PSD can be used as a screening device in a setting with asymmetric information between borrower and lender. In their model, the growth rate of the cash-flow process of a firm is private information and depends on the firm's quality. The lender, who cannot observe the true quality (cash-flow growth rate) of a potential borrower, offers a menu of contracts, which includes fixed-interest debt and risk-compensating PSD. This creates a separating equilibrium in which low-growth firms choose fixed-interest debt while high-growth firms choose risk-compensating PSD. If a low-growth firm were to deviate and choose a PSD contract, it will be perceived as a high-growth firm and hence initially pays a lower interest rate. However, low-growth firms do expect that their performance will at some point trigger an interest rate increase. Hence, they end up paying a higher interest rate when choosing a PSD contract. Therefore, if PSD contracts stipulate sufficiently high interest rate increases if firm quality is revealed as low, no firm has an incentive to deviate in equilibrium.

In their model, Manso et al. (2010) assume that the manager of a firm correctly assesses the cash-flow growth rate of his firm and chooses the debt contract that is optimal given the firms' quality. However, recent literature questions this assumption (e.g., Malmendier and Tate (2005)). In particular, *optimistic* managers will persistently overestimate the firms' cash-flow growth rate while *rational* managers will correctly assess the firms' quality. Believing to be of high quality, optimistic managers will (irrationally) find PSD as

attractive as rational managers of truly high quality. As a result, optimistic managers of low-growth firms may now decide to pool with rational managers of high-growth firms.[2]

Hypothesis 1: *Optimistic managers are more likely to issue risk-compensating PSD than rational managers.*

Note that for *Hypothesis 1* to hold, we do not require the assumption that the average true quality of the firms managed by optimistic managers is actually inferior to the quality of firms managed by rational managers. We only require that there are firms for which it is optimal to issue PSD and firms for which it is optimal to issue fixed-interest debt in both groups. Then some low-growth firms that are managed by optimistic managers will issue PSD, as the optimistic managers overestimate the firms' cash-flow growth rate. Firms with a comparable quality that are managed by rational managers will choose fixed-interest debt instead.

Manso et al. (2010) assume for simplification that there are only two types of firms: low-growth firms and high-growth firms. This assumption can be relaxed without affecting the separating equilibrium. Under the assumption that a continuous distribution of cash-flow growth rates exists, PSD screens different types through different levels of risk-compensation. Fixed-interest debt can simply be considered as a PSD contract with a pricing grid that is flat.

Consider for example a setting with three different types of firms: low-growth, medium-growth, and high-growth. In this situation a separating equilibrium can still be achieved: The low-growth firm chooses a PSD contract with no (or low) interest-increase potential, the medium growth firm chooses a

[2] From the lender's perspective the pooling equilibrium is unproblematic as long as the commitment to pay higher coupons in the future adequately compensates for the risk of lending to low quality borrowers, the fraction of firms with optimistic managers is low, or managerial optimism is observable.

PSD contract with some interest-increase potential, and the high-growth firm chooses a PSD contract with a high interest-increase potential. This implies that there must be cross-sectional variation *within* PSD contracts if one allows for a range of different firm qualities. If optimistic managers overestimate the cash-flow growth rate of their firms, this implies that — conditional on choosing PSD — optimistic managers will choose PSD with a higher risk-compensation than rational managers. Some medium-growth firms with optimistic managers will pool with high-growth firms managed by rational managers, and thereby choose riskier PSD contracts on average.

Hypothesis 2: *Optimistic managers choose PSD with more risk-compensation than rational managers.*

Our theory builds on the fact that optimistic managers mimic firms with higher quality by using PSD. If this is the case, then the post-issue performance of optimistic firms using PSD is expected to be worse. *Hypothesis 1* stipulates that some low-growth firms with optimistic managers choose PSD contracts and pool with high-growth firms that have a rational manager. Therefore the set of firms with rational managers that have issued PSD contracts solely consists of high-growth firms, while the set of firms with optimistic managers that have issued PSD contracts consists of both high-growth and low growth firms. This gives rise to a third hypothesis:

Hypothesis 3: *The performance following a PSD issue is worse for firms with optimistic managers than for firms with rational managers.*

3 Data Description

3.1 Managerial Optimism

We start by classifying CEOs as either rational or optimistic following Malmendier and Tate (2005), i.e., we measure optimism based on executive option holdings. We use ExecuComp to obtain information on executive stock option grants, exercised options, and option holdings. We restrict our sample to the 1992 to 2010 period and exclude financial firms (SIC codes 6000-6999). As ExecuComp contains option exercises only in an aggregated form and not on the grant level, we follow Hall and Liebman (1998) and apply a FIFO-algorithm to construct the option portfolios in a given year.[3] Thereby executives are classified as optimistic when they ever hold an option until maturity which is at least 40% in-the-money at the year-end prior to maturity.[4] Thus, optimism is considered as an inherent, time-invariant personal characteristic of the executive.

Executives generally have a large exposure to their firms' idiosyncratic risk as a large portion of their compensation is equity based and their human capital is closely tied to their firms. Furthermore, their diversification abilities are limited due to legal constraints on short-selling of company stock (Malmendier and Tate (2008)). Thus, when faced with the decision to exercise in-the-money stock options or to keep them for later exercise at potentially higher prices in the future, diversification arguments clearly call for an early exercise. Optimistic manager, however, have an upwardly biased view on the future performance of their firm and would consequently overstate the benefits

[3] Further details concerning the construction of the option portfolios and the optimism classification are discussed in General Appendix A.

[4] The threshold is derived according to Hall and Murphy (2002) by using a constant risk aversion parameter of three and 67% of wealth in company stock. The original Malmendier and Tate (2005) classification does not require a minimum threshold for the moneyness and solely requires option holding until maturity.

of retaining the options. Thus, while rational manager would divest stock options that are sufficiently deep in-the-money, optimistic manager would retain them for later exercise.

3.2 Loan Sample

We obtain loan contract information from LPC Dealscan for all companies for which the CEO of the borrowing firm can be classified as optimistic or rational.[5] We additionally merge our loan deal panel to COMPUSTAT to obtain financial information on the borrowers.[6] We refer to Table 10 in the Appendix for a detailed description of the control variables used.

Dealscan reports information on performance pricing provisions included in loan contracts. In particular, Dealscan reports the pricing grid, i.e., a step function schedule linking the interest payments to a measure of financial performance.[7] We define a dummy variable, PSD, which equals one if a loan contract includes a peformance pricing provision and zero otherwise. We further distinguish between interest-increasing PSD, i.e., contracts in which the interest rate on the loan increases when the borrower's creditworthiness declines, and interest-decreasing PSD, i.e., contracts in which the interest rate on the loan decreases when the borrower's creditworthiness improves. In particular, we define the following ratio:

$$Rate\ De\text{-}/Increase = \frac{(S_{Initial} - S_{Min})}{(S_{Max} - S_{Min})}. \tag{1}$$

[5] As common in the literature the loan panel is created on the facility (tranche) level (see Berg, Saunders, and Steffen (2013), and Bharath, Dahiyab, Saunders, and Srinivasan (2007)).

[6] We use the link provided by Michael Roberts to merge Dealscan with COMPUSTAT (see Chava and Roberts (2008) for details). We obtain borrower information from the last available fiscal year before the loan issue.

[7] The most common financial measure used in PSD contracts reported in Dealscan is the Debt-to-EBITDA ratio ($\sim$ 50% of all PSD loans issued by U.S. borrowers) followed by the senior debt rating ($\sim$ 25%). Other less commonly used measures are the interest coverage ratio, the fixed charge ratio or leverage. A minority of PSD deals uses multiple performance criteria.

$S_{Initial}$ is the interest rate paid at contract inception and S_{Max} (S_{Min}) is the highest (lowest) interest rate defined in the pricing grid. *Rate De-/Increase* is zero (one) if the pricing grid allows for interest increases (decreases) only. Contracts with a ratio between zero and one allow for both interest rate increases and interest rate decreases. We define indicator variables for three quantiles of this ratio to categorize PSD contracts into (mainly) interest-increasing, mixed, and (mainly) interest-decreasing.[8] Disentangling interest-increasing and interest-decreasing PSD is important as our main hypotheses are derived for interest-increasing PSD.[9]

Figure 1 shows the pricing grid of a loan issued by IBM in March 2004 as an example. In this contract, the interest rate changes with IBM's senior debt rating. Since IBM's senior debt rating at the time of the issue was A+, this loan is an example of a mixed PSD contract.

[Figure 1 here]

3.3 Descriptive Statistics

We provide descriptive statistics for borrower and loan characteristics in Table 1. We divide the sample into firms managed by optimistic and rational managers. Panel A reports descriptives for borrower characteristics. Unsurprisingly the companies in our sample are large. By relying on information from the ExecuComp database, which covers all companies listed in the S&P 1,500, we effectively restrict our sample to large public U.S. com-

[8] For robustness we replicated all our specifications defining only contracts as interest-increasing (interest-decreasing) if *Rate De-/Increase* is exactly equal to zero (one). The remaining PSD contracts, i.e., contracts with *Rate De-/Increase* between zero an one, are defined as mixed. All our results remain qualitatively unchanged if we use this alternative definition.

[9] The use of interest-decreasing PSD can be motivated by other reasons. Asquith et al. (2005) for example argue that interest-decreasing PSD is a prepayment option for the borrower that does not require renegotiation. The interest rate is automatically reduced when there are unanticipated improvements in the borrower's, thereby lowering renegotiation costs.

panies. Borrowers with CEOs that are classified as optimistic are on average smaller compared to borrowers with CEOs that are classified as rational. The mean/median size is \$7,452/\$2,225 million USD for rational borrowers and \$6,502/\$2,136 million USD for optimistic borrowers. The other borrower characteristics are similar. Panel B.1 provides descriptive statistics for general loan characteristics. Consistent with *Hypothesis 1*, we find that the fraction of PSD contracts is four percent higher in the sample of loans issued by borrowers with optimistic CEOs when compared with loans issued by borrowers with rational CEOs (57% vs. 53%). The median loan amount is \$250 million for both groups and also the median maturity is similar (about five years). Panel B.2 provides descriptive statistics for the subset of performance-sensitive loans. Within PSD contracts firms managed by optimisitc managers in particular issue more interest-increasting PSD when compared to firms managed by rational managers.

[Table 1 here]

4 Managerial Optimism and Performance-Sensitive Debt

4.1 Performance-Sensitive vs. Straight Debt

In this section, we analyze the relationship between managerial optimism and the use of PSD. We begin by establishing a general link, i.e we employ the following Probit regression specification:

$$Pr\left(PSD_{it}=1\right)=probit\left(\alpha+\beta*Optimistic_{it}+\gamma*X'_{it-1}\right). \qquad (2)$$

The dependent variable, PSD, is a dummy variable, which equals one if the loan contract includes a performance pricing provision and zero otherwise. *Optimistic* indicates whether the borrowing firm is managed by an optimistic CEO. X is a set of borrower and loan characteristics.[10] Further included are industry, time, and rating fixed effects.

[Table 2 here]

The results reported in Table 2 indicate that managerial traits significantly impact the firms' decision to issue PSD. Loans issued by optimistic CEOs are about six percent more likely to be performance-sensitive than loans issued by rational CEOs. Analyzing the control variables, we find that smaller firms are more likely to issue PSD. Further, larger loans and loans that have a longer maturity are more likely to be performance-sensitive. These findings are consistent with the existing literature, which argues that PSD can be used to overcome asymmetric information problems (Asquith et al. (2005), Manso et al. (2010)).

We now turn to the question whether the higher likelihood to use PSD by optimistic managers is driven by interest-increasing or interest-decreasing PSD. We run a multinomial logit regression, where the dependent variable can take on four values: zero for straight debt, one for (mainly) interest-increasing PSD, two for mixed PSD, and three for (mainly) interest-decreasing PSD.

[Table 3 here]

Table 3 shows that the effect reported in Table 2 is solely driven by the preference of optimistic managers for risk-compensating PSD contracts. Optimistic managers are about 4.4% more likely to use interest-increasing

[10] As noted in the data section, we obtain borrower information from the last available fiscal year *before* the loan issue ($t-1$).

PSD, while we find no significant correlation between optimism and mixed or interest-decreasing PSD. Overall, the findings are consistent with *Hypothesis 1.*

4.2 PSD Pricing-Grid Structure

Hypothesis 2 stipulates that optimistic managers choose PSD with more risk-compensation than rational managers. To test this hypothesis we analyze the structure of PSD pricing grids in more detail. Figure 3, shows the average pricing grid for firms with optimistic and rational CEOs. The graph indicates that the difference between the maximum and minimum interest rate is on average higher when the CEO of the PSD-issuing firm is optimistic than when the CEO is rational.[11] The graphical evidence serves as a first indication, however, borrowers with optimistic CEOs and borrowers with rational CEOs are not unconditionally comparable as borrower characteristics may differ.

[Figure 3 here]

To test *Hypothesis 2* in a more refined way, we follow Tchistyi et al. (2011) and calculate slope measures to proxy for the risk of PSD contracts. These slope measures relate interest rate changes that result from a credit rating change (as defined in the pricing grid) to the difference in market interest rates over the same rating notches.[12] A slope of one implies that the pricing grid simply reflects the market interest rate structure at the time of the loan issue. A slope measure greater than one indicates that the borrower "overpays" for downgrades and/or receives a larger interest rate reduction compared to the market for upgrades. To disentangle the up- and downgrade effect we further calculate the slope measure separately over the interest-increasing and

[11] The median credit rating at the time of the loan issue is BBB+ for both optimistic and rational CEOs, suggesting that the differences in the pricing grids are not driven by differences in the riskiness of the issuing firm.

[12] Note that we can only calculate the slope measures for the subset of PSD contracts that relate interest rate changes to the borrower's credit rating.

interest-decreasing region of the pricing grid. Similar to Tchistyi et al. (2011), we also calculate the slope measures "locally" (pricing steps directly adjacent to the initial interest rate) and as averages (average over the entire pricing grid). The local slope measure is formally defined as:

$$LocalSlope = 0.5 * \left(\frac{(S_{i+1} - S_i)}{(Bond_{i+1} - Bond_i)} + \frac{(S_i - S_{i-1})}{(Bond_i - Bond_{i-1})} \right), \quad (3)$$

where S_i is the interest rate that the borrower pays at the initial rating i. S_{i+1} (S_{i-1}) is the interest rate that the borrower has to pay when the company is downgraded (upgraded) and the next pricing step at the rating $i+1$ ($i-1$) is reached.[13] $Bond_i$, $Bond_{i+1}$, and $Bond_{i-1}$ are the levels of the bond market index for the respective rating notches at the time of the loan issue. We use the level of the Bloomberg Bond Market Index for each rating notch at the time of a loan issue. As noted above the average slope is calculated similarly by using all interest rate changes defined in the pricing grid. Figure 2 again illustrates the procedure.

[Figure 2 here]

OLS regression results relating the slope of rating-based PSD contracts and fixed rate debt contracts to managerial optimism are reported in Table 4.[14] We address skewness in the slope measure by using $ln(Slope)$ in the regressions.

[Table 4 here]

[13] Note that we are interested in the risk arising from actual interest changes. For the majority of the PSD contracts the next pricing step is at the next rating notch but this does not have to be the case. Sometimes the same interest rate is defined for more than one rating notch. We only relate actual interest rate changes to changes in the bond market index.

[14] We obtain qualitatively the same results when using a Tobit specification with zero as the lower bound.

As shown in Table 4, we find — consistent with *Hypothesis 2* — that loans issued by companies where the CEO is classified as optimistic have significantly higher local slopes for rating decreases. This means that optimistic CEOs choose pricing provisions that allow for larger interest rate increases (relative to the market yield) than PSD contracts chosen by rational CEOs. Results for the average slope measures are similar to those for the local slope measures. Consistent with our hypotheses, the slopes of the pricing grids chosen by optimistic CEOs are in particular larger over the interest-increasing region compared to the slopes of the pricing grids chosen by rational CEOs.

4.3 Post-Issue Performance

We have shown, consistent with the hypothesis that optimistic managers mimic high growth firms, that firms managed by optimistic managers issue more and risker PSD than firms managed by rational managers. In this subsection, we test whether firms with optimistic managers perform worse after issuing interest-increasing PSD relative to firms with rational managers (*Hypothesis 3*). In particular, we estimate the following model:

$$\Delta Performance_{it+k} = \alpha + \beta_1 * Optimistic_{it} + \gamma * X'_{it-1} + \epsilon_{it}. \tag{4}$$

$\Delta Performance_{it+k}$ is the change in financial performance of the borrower between the year of the loan issue (t) and k years after the issue ($k = 1, 2$).[15] We use two different measures of firm performance: the Debt-to-EBITDA ratio and the credit rating. These two measures are the two most common performance measures used in PSD contracts.[16] The regression in-

[15] Note that, as we are interested in the post-issue performance, we ensure that we measure the firm performance relative to the first financial statement *after* the loan issue to ensure that we do not simply capture the effect of the loan issue itself. $t + 1$ ($t + 2$) therefore refers to the 2nd (3rd) financial statement after the loans issue, i.e., to a point in time that is on average more than one (two) calendar year(s) after the loan issue.

[16] More than 75% of all PSD contracts are written on either the issuer's credit rating or the issuer's Debt-to-EBITDA ratio.

cludes interest-increasing PSD contracts only.[17] We focus on interest-increasing PSD as we hypothesize that firms with optimistic managers choose more risk compensating PSD and perform worse compared to firms with rational managers in this subset. Table 5 presents the regression results.

[Table 5 here]

In columns 1 to 2, we see that the Debt-to-EBITDA ratio of firms with an optimistic CEO increases in the years after a PSD issue relative to firms with a rational CEO. The effect is also large in economic terms. A change of 0.4 (column 1) represents about one half of the standard deviation of the Debt-to-EBITDA ratio. This suggests that the performance of these firms deteriorates after the loan issue, leading to higher interest payments. In column 3 to 4, a dummy variable is used as the dependent variable, which equals one if the issuer is downgraded following the loan issue and zero otherwise. The credit rating of firms with optimistic CEOs is about five percent more likely to deteriorate following a PSD issue relative to firms managed by rational CEOs. This is consistent with the hypothesis that firms with optimistic CEOs perform worse than firms with rational CEOs after issuing PSD and exhibit increasing interest rates during the life of the contract.

Note that, the results in Table 5 also rule out an alternative explanation for our findings. Delaying an option exercise can be a rational strategy if the manager possesses positive inside information. Therefore, *Optimistic* may capture positive inside information of a manager and not irrational overoptimism. This could also explain our finding with respect to PSD issues: If the manager possesses positive inside information, it is rational to issue PSD because the manager knows that a deteriorating firm performance is unlikely. However, if this were the case we would expect their performance after the

[17] Using both PSD and straight debt contracts and interacting *Optimistic* with a PSD indicator variable yields qualitatively similar results.

loan-issue to be better compared to other managers. Our findings suggest that they perform worse.

4.4 Endogeneity

Managerial optimism could be a selection criterion when a firm chooses its CEO. The same firm characteristics may simultaneously affect the selection of the CEO and the choice of PSD. In order to address this problem we use a propensity score matching approach and estimate the probability that a firm is managed by an optimistic CEO using a probit regression with total assets, leverage, market-to-book, asset tangibility, interest coverage, profitability, current ratio, firm age, and industry-, year- and credit rating fixed effects as control variables. Hirshleifer, Low, and Teoh (2012) argue that a reason for hiring optimistic CEOs might be that optimistic managers are more likely to invest in more innovative and riskier projects and can thereby benefit shareholders. We explicitly control for firm age in the first stage regression because innovations are more important in younger firms.[18] In untabulated results we find that firms with lower leverage ratios, higher market-to-book ratios, lower interest coverage ratios, and younger firms are more likely to be managed by optimistic CEOs. In the next step we match firms based on the probability to be managed by an optimistic CEO, i.e., we match one firm that is managed by an optimistic CEO to a firm that is equally likely to be managed by an optimistic CEO but is indeed managed by a rational CEO.

[Table 6 here]

In Table 6 we report results of a probit regression specification similar to Table 2 for the matched sample. We find that optimistic CEOs are eight to

[18] We compute firm age based on the data provided by Laura Field and Jay Ritter available on http://bear.warrington.ufl.edu/ritter/foundingdates.htm. The data is described in detail in Loughran and Ritter (2004). Firm founding dates are only available for roughly 50% of our sample which explains the lower number of observations in Table 6.

nine percent more likely to issue performance-sensitive debt contracts. Thus, our results hold after accounting for the endogenous selection of optimistic CEOs.

The drawback of the propensity score matching is that the choice to hire an optimistic CEO can only be modeled based on observable firm characteristics. To control for unobservable firm characteristics that might be correlated with the use of PSD and managerial optimism, we analyze CEO turnover. In particular, we investigate whether more loans with a performance pricing feature are issued after CEO turnover with an incoming optimistic CEO relative to turnover with an incoming rational CEO. Because we are only able to classify a fraction of all CEOs as optimistic or rational[19] and conditioning on the type of the former CEO would decrease our sample size considerably, we solely focus on the type of the incoming CEO. Not conditioning on the type of the former CEO is thereby conservative as it introduces noise which, if anything, reduces the statistical power of our tests. Further, we focus on the three years before and after the turnover event.[20] We estimate two separate linear probability models with a dummy variable equal to one if the company issues a loan with a performance pricing provision and zero otherwise as dependent variable. The first column includes only observations where the incoming CEO is optimistic, the second column only observations where the incoming CEO is rational. Both regressions include the same control variables as in Table 2. To see whether optimistic CEOs pursue a different policy with respect to the use of PSD we estimate a difference-in-differences model. The first difference is calculated as the difference between the fraction of loans with a performance-pricing feature before and after the CEO turnover, represented by the coefficient *Post Turnover*. The second difference is the difference in the coefficient *Post Turnover* between optimistic and rational CEOs.

[19] Cf. Section 3.1.

[20] We find qualitatively the same results if we vary the event window and use, for example, five years before and after the turnover.

[Table 7 here]

Results are presented in Table 7. We find that optimistic CEOs significantly increase the fraction of loans with a performance pricing provision while rational CEOs seem to decrease the fraction of PSD (although not significantly). The difference between both coefficients is significantly different from zero suggesting that optimistic CEOs are more likely to issue PSD relative to rational CEOs when controlling for unobservable (time-invariant) firm effects.

5 Robustness

5.1 Other Optimism Measures

In this section, we analyze whether our results are sensitive to the chosen optimism classification parameters and whether they are robust to alternative specifications and classification methods.

[Table 8 here]

Table 8 mirrors Table 2 but uses alternative specifications to classify executives as optimistic or rational. In particular, we use five alternative classification methods. The optimism measures used in the specifications reported in columns 1 and 2 have more conservative moneyness thresholds than our original optimism classification but are otherwise identical. In particular, we classify executives as optimistic when they ever hold an option until one year prior to expiration even though it is at least 70% in-the-money (alternative 1) or if it is at least 100% in-the-money (alternative 2). The original classification uses a moneyness threshold of 40%. The results in Table 8 confirm our previous findings. Firms managed by optimistic CEOs are significantly more likely to include a performance pricing provision in their loan contracts than

firms managed by rational CEOs. Thus, the results are not sensitive to the choice of the moneyness parameter in our classification method.[21]

Alternative 3 separates observations for CEOs that we classify as optimistic, using our original classification method, into two time periods. *Pre-Longholder* refers to the time period before the respective executive first holds an option that is at least 40% in-the-money until the final maturity year and *Post-Longholder* refers to the time period thereafter. Table 8 shows that optimistic CEOs are significantly more likely to use PSD than rational CEOs, both before and after they are classified by our algorithm. This finding supports the notion to treat optimism as an inherent, time-constant, personal characteristic.

In alternative 4 (*Holder 67*) we employ a different classification method, suggested by Malmendier and Tate (2005). Hereby, CEOs are classified as optimistic if they hold options five years after the option grant that are at least 67% in the money.[22] The CEOs have to show this behavior at least twice during their tenure in order to be classified as optimistic. The results are even stronger with the *Holder 67* measure and confirm our findings.

Alternative 5 uses the executives' stock holdings in order to classify them as rational or optimistic. Following Sen and Tumarkin (2009), we consider executives as optimistic if they hold company stock in excess of the median stock holding-to-salary ratio. As executives typically have a large exposure to firm specific risk, they should hold a minimum amount of their companies' stock.[23] However, firms often set minimum stock holding requirements for their key executives, typically expressed as multiples of the executives' salary (Core and Larcker (2002)). Thus, we follow Sen and Tumarkin (2009) and use the median stock holding-to-salary ratio to discriminate rational and op-

[21] This finding is consistent with Malmendier and Tate (2008) whereupon "any assumption from no threshold at all to a threshold of 100% yields similar results" in their analysis of acquisition activity.

[22] We are grateful to Rik Sen for providing us with this measure.

[23] The intuition is similar to the one for option exercise behavior.

timistic CEOs. Again, Table 8 confirms our previous findings as firms with optimistic CEOs are more likely to use performance pricing provisions than firms managed by rational CEOs. Overall, our findings are robust to alternative optimism specifications.

5.2 CEO Characteristics

This section examines the effect of observable CEO characteristics on debt contract design. Bertrand and Schoar (2003) show that managerial style, which likely is affected by manager characteristics such as age, gender or educational background, significantly affects corporate financial policy.[24] To address the concern that our optimism measure is correlated with CEO characteristics that also affect risk-taking (and therefore the decision to issue PSD), we explicitly control for CEO age, tenure, gender, and education for robustness.

In addition to personal managerial characteristics, executive compensation can affect risk-taking. In the context of PSD, Tchistyi et al. (2011) document that firms whose managers' compensation is more sensitive to stock price volatility (return) choose more (less) risky pricing grids. If our optimism measure would be positively correlated with the vega of the CEOs stock option portfolio, our results could indicate rational risk-seeking behavior instead of the alleged optimism bias. We therefore explicitly control for these sensitivities for robustness.[25] The results are reported in Table 9.

[Table 9 here]

Besides optimism, the only variable that is significantly correlated with the decision to issue PSD is age, i.e., the age of the CEO at the time of the debt issue (in years). Firms with older CEOs are less likely to issue loans

[24] For example, Beber and Fabbri (2010) find that CEO age and education is correlated with speculation in the FX market.
[25] We follow Core and Guay (2002) in calculating delta and vega.

that contain performance-pricing provisions. The other personal characteristics and the delta and the vega of the CEOs stock and option portfolio are not significantly related to the decision to issue PSD. As noted above, controlling for delta and vega mitigates concerns that our optimism measure is positively correlated with a larger general risk preference by those executives.

6 Conclusion

This paper explores the impact of managerial optimism on debt contract design. In particular, we investigate whether optimistic CEOs, i.e., managers who persistently overestimate their firms' future expected cash flow, are more likely to issue performance-sensitive debt (PSD) than rational managers. This possibility arises when optimistic managers decide to pool with rational managers who signal their credit worthiness using PSD.

We find that optimistic managers are indeed more likely to issue PSD than rational managers. We further find that within the subset of PSD, optimistic managers choose contracts with larger risk-compensation to lenders, i.e., pricing grids with steeper slopes and more potential for interest rate increases in response to performance deterioration. Furthermore, we find inferior post-PSD-issue performance for borrowers with optimistic managers compared to borrowers with rational managers. This finding is consistent with an overestimation of the firms' credit quality by optimistic managers and suggests that our results are not driven by managers who rationally choose PSD contracts to exploit an information advantage. In addition, our results are robust to the endogenous choice of the CEO.

Overall, our results suggest that managerial optimism can have a significant impact on a firm's debt contract design. It does not only affect the choice of the general leverage ratio but it also has a direct impact on the chosen debt instrument and its riskiness.

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Appendix

A.1 Figures

Figure 1: PSD Pricing Grid Example

This figure exemplary shows the pricing grid embedded in the loan contract negotiated by International Business Machines Corporation (IBM) in March 2004. Information are taken from the Dealscan database. The steps show the interest rate contingent upon the issuers credit rating. IBM's credit rating at the time of the loan issues was A+, the initial interest rate LIBOR + 12bp.

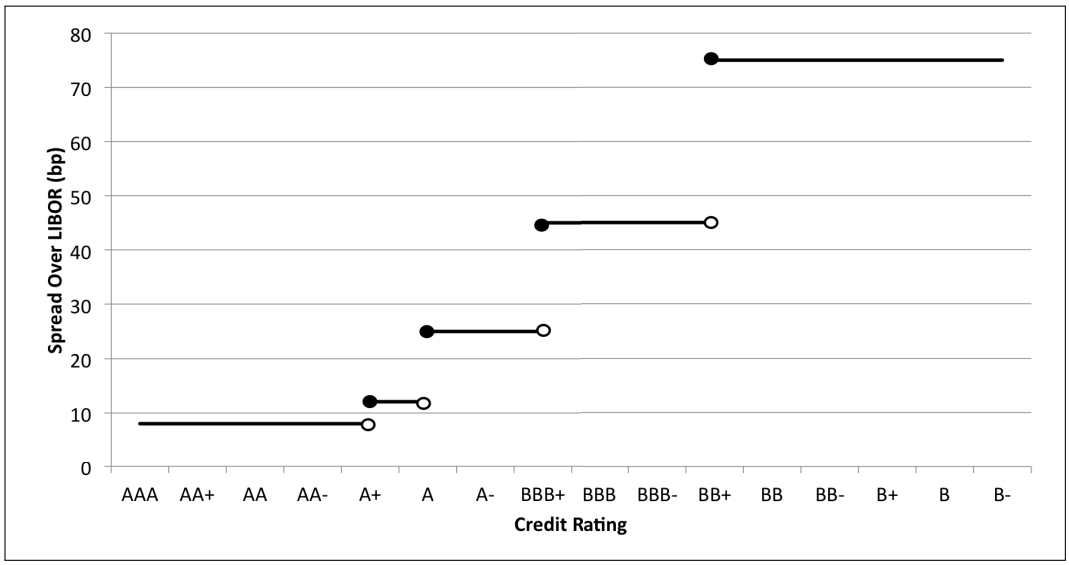


Figure 2: Slope of the PSD Pricing Grid

This figure shows a hypothetical rating based performance pricing grid that links the borrower's credit rating to the interest rate S over a benchmark (e.g., LIBOR). Interest payments increase if the rating deteriorates and decline if the rating improves. This hypothetical pricing grid is defined over the ratings AA- to BBB. The rating as of loan issue is A-. The local measures are calculated over the pricing steps adjacent to the initial rating while the average measures are calculated over the entire pricing grid. The definitions of the local slope measures for this hypothetical performance pricing grid are:

$$\text{Local Slope} = 0.5 * \left(\frac{(S_{BBB+} - S_{A-})}{(Bond_{BBB+} - Bond_{A-})} + \frac{(S_{A-} - S_{A+})}{(Bond_{A-} - Bond_{A+})} \right)$$

$$\text{Local Slope} \uparrow = \frac{(S_{A-} - S_{A+})}{(Bond_{A-} - Bond_{A+})}$$

$$\text{Local Slope} \downarrow = \frac{(S_{BBB+} - S_{A-})}{(Bond_{BBB+} - Bond_{A-})}$$

The average slopes are calculated similar to the local slope measure but using all pricing steps that are defined in the grid.

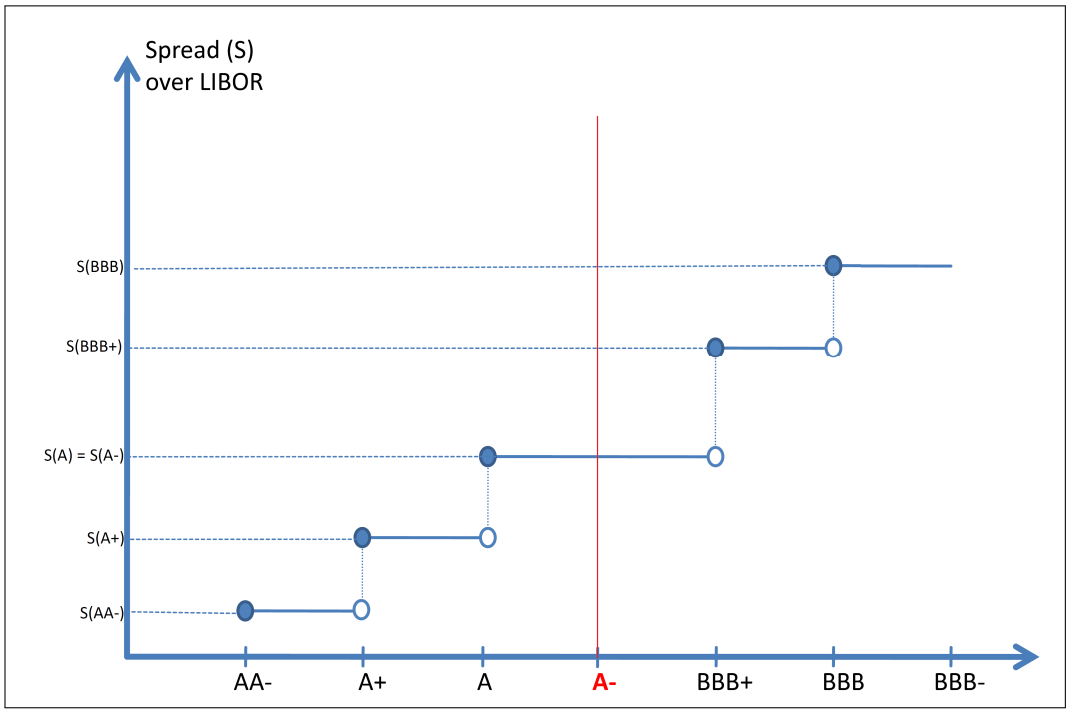
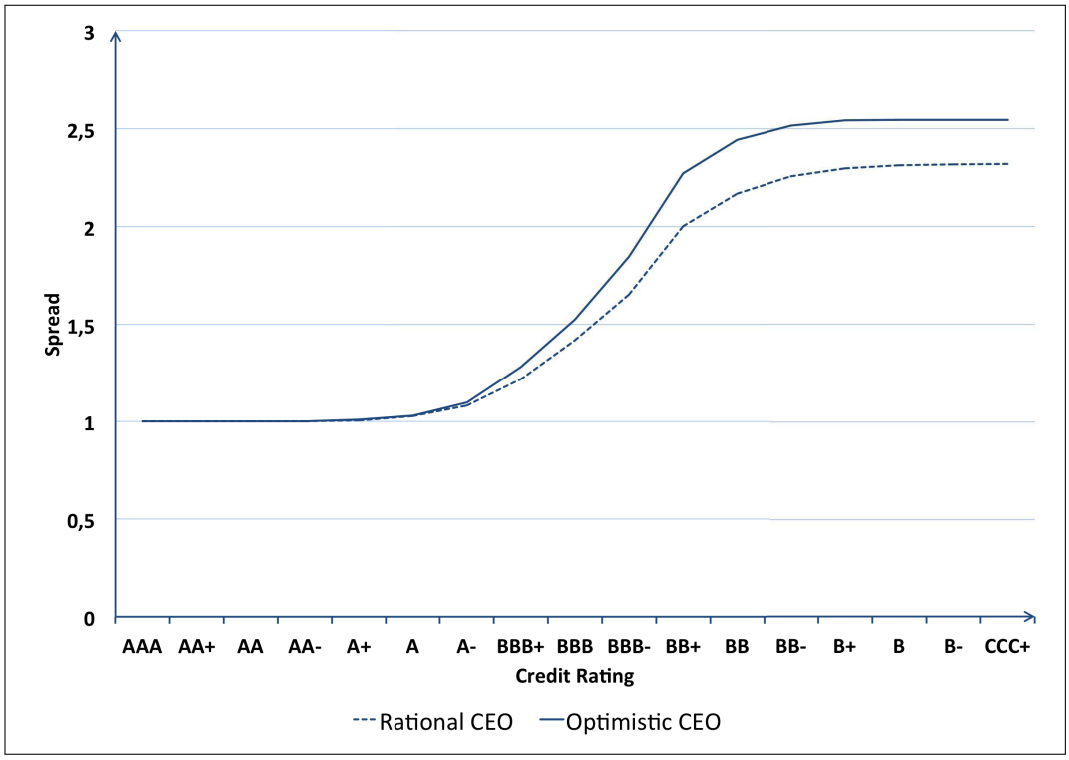


Figure 3: PSD Pricing Grids - Optimistic vs. Rational CEOs

This figure shows pricing grids for firms with optimistic CEOs (straight line) and rational CEOs (dashed line). The pricing grid is calculated by taking the average spread over LIBOR for each rating notch relative to the spread paid when the rating is AAA. These calculations are performed for both groups individually.



A.2 Tables

Table 1: Descriptive Statistics: Rational vs. Optimistic CEOs

This table reports descriptive statistics for loan and borrower characteristics. The sample is divided into firms with rational and optimistic CEOs. All variables are defined in Table 10.

	Rational CEOs				Optimistic CEOs			
	Mean	Median	Std. Dev	#	Mean	Median	Std. Dev	#
Panel A: Borrower Characteristics								
Total Assets (million USD)	7,452.15	2,224.88	14,060.66	4,500	6,501.62	2,135.63	13,205.37	2,434
Leverage	0.27	0.26	0.19	4,500	0.25	0.24	0.16	2,434
Market-To-Book	1.78	1.48	0.95	4,500	1.87	1.60	0.95	2,434
Tangibility	0.35	0.29	0.23	4,500	0.33	0.26	0.24	2,434
Coverage	22.11	7.10	52.11	4,500	22.42	9.19	49.37	2,434
Profitability	0.18	0.15	0.15	4,500	0.17	0.14	0.13	2,434
Current Ratio	1.75	1.50	1.05	4,500	1.77	1.57	0.99	2,434
Not Rated (0/1)	0.31	0.00	0.46	4,500	0.31	0.00	0.46	2,434
Investment Grade (0/1)	0.43	0.00	0.50	4,500	0.46	0.00	0.50	2,434
Panel B.1: General Loan Characteristics								
Facility Amount (million USD)	537.39	250.00	987.89	4,500	539.44	250.00	1,021.55	2,434
Maturity (months)	44.16	50.00	23.08	4,500	43.99	55.00	22.58	2,434
Multiple Tranches (0/1)	0.42	0.00	0.49	4,500	0.44	0.00	0.50	2,434
Term Loan (0/1)	0.20	0.00	0.40	4,500	0.18	0.00	0.38	2,434
Secured	0.37	0.00	0.48	4,500	0.33	0.00	0.47	2,434
PSD (0/1)	0.53	1.00	0.50	4,500	0.57	1.00	0.49	2,434
Panel B.2: PSD Characteristics								
PSD(Rating) (0/1)	0.43	0.00	0.50	2,367	0.44	0.00	0.51	1,397
PSD(Accounting) (0/1)	0.58	1.00	0.49	2,367	0.57	1.00	0.50	1,397
PSD(Increasing) (0/1)	0.12	0.00	0.33	2,367	0.14	0.00	0.35	1,397
PSD(Mixed) (0/1)	0.67	1.00	0.47	2,367	0.65	1.00	0.48	1,397
PSD(Decreasing) (0/1)	0.19	0.00	0.39	2,367	0.18	0.00	0.39	1,397
Pricing Steps (#)	4.73	5.00	1.30	2,367	4.71	5.00	1.31	1,397

Table 2: Performance-Sensitive vs. Straight Debt

This table reports the marginal effects for a probit regression using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO of the borrower is classified as optimistic and zero otherwise. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating dummies when indicated. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)
Panel A: Optimism Classification				
Optimistic	0.063***	0.061***	0.058***	0.057***
	(0.022)	(0.022)	(0.022)	(0.022)
Panel B: Borrower Characteristics				
ln(Total Assets)			−0.032***	−0.097***
			(0.011)	(0.013)
Leverage			−0.088	−0.096
			(0.069)	(0.069)
Market-to-Book			−0.003	−0.004
			(0.012)	(0.012)
Tangibility			−0.092	−0.043
			(0.072)	(0.075)
Coverage			0.000	0.000
			(0.000)	(0.000)
Profitability			0.124	−0.002
			(0.090)	(0.089)
Current Ratio			−0.017	−0.011
			(0.012)	(0.012)
Panel C: Loan Characteristics				
ln(Facility Amount)				0.136***
				(0.010)
ln(Maturity)				0.119***
				(0.012)
Multiple Tranches				0.073***
				(0.017)
Term Loan				−0.233***
				(0.020)
Secured				0.154***
				(0.022)
Observations	6,749	6,703	6,703	6,703
Pseudo R^2	0.060	0.074	0.078	0.154
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes

Table 3: Interest Increasing vs. Interest Decreasing PSD

This table reports the marginal effects for a multinominal logit regression using a dummy as the dependent variable that equals one for PSD contracts that contain mainly spread increase features (Column 1), two for PSD contracts that contain both spread increase and spread decrease features (Column 2), three for PSD contracts that contain mainly spread decrease features (Column 3) and zero for non-PSD contracts (base group). The main variable of interest is *Optimistic*, which indicates the probability of optimistic CEO to choose a loan contract with the respective spread change feature. The regressions furthermore include all control variables used in Table 2. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	**(2)**	**(3)**
Optimistic	0.044***	0.007	0.007
	(0.017)	(0.012)	(0.005)
Observations	6,718		
Pseudo R^2	0.182		
Control Variables	Yes		
Year Fixed Effects	Yes		
Industry Fixed Effects	Yes		
Credit Rating Fixed Effects	Yes		

Table 4: Managerial Optimism and the Slope of PSD Contracts

This table reports OLS regressions, relating the slope of the performance pricing grids to CEO, borrower and loan characteristics. The sample includes straight debt contracts and rating-based PSD contracts. The dependent variables are slope measures for the PSD pricing grids. The local slope is defined as follows.

$$\textit{Local Slope} = 0.5 * \left(\frac{(S_{i+1} - S_i)}{(Bond_{i+1} - Bond_i)} + \frac{(S_i - S_{i-1})}{(Bond_i - Bond_{i-1})} \right)$$

S_i is the spread that the borrower pays at the initial rating i. S_{i+1} (S_{i-1}) is the spread hat the borrower has to pay when the company is downgraded (upgraded) and the next pricing step at the rating $i+1$ ($i-1$) is reached. $Bond_i$, $Bond_{i+1}$, and $Bond_{i-1}$ are the levels of the bond market index for the respective rating notches at the time of the loan issue. The slope of straight debt is zero. While the *Local Slope* is defined over the pricing steps directly adjacent to the initial pricing step only, the *Average Slope* is calculated as a mean over all pricing steps defined in the grid. *Local Slope* ↑ and *Average Slope* ↑ are defined over all credit ratings above the firm's rating at the time of contract inception, i.e., for rating upgrades. *Local Slope* ↓ and *Average Slope* ↓ are defined over all credit ratings below the firm's rating at the time of contract inception, i.e., for rating downgrades. The main independent variable of interest is *Optimistic*, which is an indicator variable, which equals one if the CEO of the borrower is classified as optimistic and zero otherwise. The regressions furthermore include all control variables used in Table 2. All variables are defined in Table 10. The regressions include time, industry, and rating dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1) Local Slope	(2) Local Slope ↑	(3) Local Slope ↓	(4) Average Slope	(5) Average Slope ↑	(6) Average Slope ↓
Optimistic	0.014**	0.006	0.018***	0.012*	0.009	0.014**
	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
Observations	4,502	4,365	4,428	4,502	4,366	4,430
Adjusted R^2	0.228	0.206	0.210	0.229	0.230	0.208
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Post-PSD-Issue Performance

This table reports OLS regressions showing the change in Debt-to-EBITDA between the year of the loan issue *(t)* and k years after the issue *(k = 1,2)*. The sample is restricted to PSD contracts with a spread-increase potential. This table further reports marginal effects of probit regressions using a dummy as the dependent variable that equals one if the borrowing firm was downgraded k years after the issue of PSD. Again, the sample is restricted to PSD contracts with a spread-increase potential. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO of the borrower is classified as optimistic and zero otherwise. The regressions furthermore include all control variables used in Table 2. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, rating, and insdustry fixed effects, as well as loan, and borrower characteristics. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	**(2)**	**(3)**	**(4)**
	Δ Debt-to-EBITDA		Rating Downgrade	
	$k = 1$	$k = 2$	$k = 1$	$k = 2$
Optimistic	0.401**	0.350*	0.052*	0.021
	(0.155)	(0.185)	(0.028)	(0.042)
Observations	2,341	2,193	941	913
Adjusted R^2	0.032	0.042		
Pseudo R^2			0.105	0.057
Control Variables	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes

Table 6: Propensity Score Matching - PSD vs. Straight Debt

This table reports the marginal effects for probit regressions using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. To control for endogeneity, we estimate the probability that a firm is managed by an optimistic CEO in a first stage probit regression. *Optimistic* is an indicator variable that equals one if the CEO of the borrower is classified as optimistic, i.e., if the CEO ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise. The regressions furthermore include all control variables used in Table 2. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**
Optimistic	0.090***	0.082**
	(0.033)	(0.033)
Observations	1,716	1,716
Pseudo R^2	0.127	0.219
Control Variables	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes

Table 7: CEO Turnover - PSD vs. Straight Debt

This table reports results for fixed effects linear probability models using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. The sample solely includes loans issued during the three years before and after CEO turnover. Further, it includes only observations where the new CEO can be classified as optimistic or rational. In total, 161 CEO changes are included. *Post Turnover* is an indicator variable which equals one if the loan was issued in the three years following CEO turnover. In model (1), loan issues are included where the incoming CEO was classified as optimistic. In model (2), we include loan issues where the incoming CEO was classified as rational. The regressions furthermore include all control variables used in Table 2. All variables are defined in Table 10. The regressions include time, firm, and rating fixed effects. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**
Post Turnover	0.295**	−0.058
	(0.148)	(0.082)
Observations	236	620
Adjusted R^2	0.530	0.449
Control Variables	Yes	Yes
Year Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes

Test if coefficients are equal in both models:

Post Turnover (Optimistic) = Post Turnover (Rational)
$\chi^2(1) = 5.15$
Prob $> \chi^2 = 0.0233$**

Table 8: Alternative Optimism Classifications

This table reports the marginal effects for probit regressions using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. *Optimistic 70* and *Optimistic 100* are indicator variables that equal one if the CEO of the borrower is classified as optimistic, i.e., if the CEO ever held an option until the final maturity year, which is at least 70 or 100% in the money and zero otherwise. *Holder67* is an indicator variable that is equal to one if CEOs did not exercise options that were at least 67% in the money in their fifth year at least twice during their tenure. *Pre-Longholder* and *Post-Longholder* indicate the time period before an executive ever held an option until the final maturity year, which is at least 40% in the money and the the time period after this activity, respectively. Voluntary Holder is an indicator variable that equals one if CEOs voluntarily holds more stocks of their company than required by company constitutions. The regressions furthermore include all control variables used in Table 2. All other variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Optimistic (70)	0.050**				
	(0.024)				
Optimistic (100)		0.055**			
		(0.025)			
Pre-Longholder			0.062**		
			(0.028)		
Post-Longholder			0.050*		
			(0.027)		
Holder 67				0.077***	
				(0.027)	
Voluntary Holder					0.062***
					(0.023)
Observations	6,703	6,703	6,703	3,379	6,417
Pseudo R^2	0.153	0.153	0.154	0.167	0.147
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table 9: CEO Characteristics

This table reports the marginal effects for probit regressions using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. *Optimistic* is an indicator variables that equal one if the CEO of the borrower is classified as optimistic, i.e., if the CEO ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise. *Female* is a dummy variable that is equal to one if the CEO is female. *Ph.D.* is a dummy variable if the CEO holds a Ph.D. degree. *Tenure* is the time in days since the executive became CEO. *Delta* measures the sensitivity of the CEO's overall option and stock portfolio to price movements of the company's stock. *Vega* measures the sensitivity of the CEO's overall option and stock portfolio to volatility changes of the company's stock. The regressions furthermore include all control variables used in Table 2. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time and industry dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**	**(3)**
Optimistic	0.057**	0.053**	0.050**
	(0.023)	(0.023)	(0.023)
Female	−0.023		−0.041
	(0.080)		(0.084)
Ph.D.	0.016		−0.001
	(0.057)		(0.059)
Age	−0.003**		−0.003*
	(0.001)		(0.002)
Tenure	0.001		0.002
	(0.002)		(0.002)
Delta		−0.150	−0.133
		(0.271)	(0.275)
Vega		−0.002	−0.001
		(0.005)	(0.005)
Observations	6,567	6,139	6,008
Pseudo R^2	0.154	0.149	0.150
Control Variables	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes

Table 10: Variable Definitions

Variable Name	Definition
Managerial Characteristics:	
Optimistic	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 40% in-the-money and zero otherwise.
Pre-Longholder	A dummy variable that equals one in the time period before a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Post-Longholder	A dummy variable that equals one in the time period after a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Holder67	A dummy variable that equals one if a manager holds options five years after the option grant that are at least 67% in-the-money. This behavior has to be shown at least twice by the manager.
Voluntary Holder	A dummy variable that equals one if $\frac{Stock\ Holdings}{Salary} >= Median(\frac{Stock\ Holdings}{Salary})$ and zero otherwise, where: *Stock holdings* is the value of company stock held by the CEO in $million. *Salary* is the CEO salary in $million.
Delta	Overall delta of the option and stock portfolio held by the CEO divided by total shares outstanding. The individual stock delta is one per definition, the delta of an individual option is defined as $e^{-dT}N(Z)$.
Vega	$e^{-dT}N^{'}(Z)ST^{1/2} * (0.01)$. In our regressions we use $log(1+vega)$ to correct for the skewness of vega. where: $Z = \left[ln\left(S/X\right) + T\left(r - d + \sigma^2/2\right)\right]/\sigma T^{1/2}$ N = cumulative probability function for the normal distribution $N^{'}$ =normal density function. S = price of the underlying stock X = exercise price of the option

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Table 10 – continued from previous page

Variable Name	Definition
	σ = expected stock-return volatility over the life of the option
	r = natural logarithm of the risk-free rate
	T = time to maturity of the option in years
	d = natural logarithm of expected dividend yield over the life of the option
Female	A dummy variable that equals one if the CEO is female.
Ph.D.	A dummy variable that equals one if the CEO holds a Ph.D. degree.
Age	Age of the CEO in years at the time of the debt issue.
Tenure	Time in days since the executive became CEO.
Borrower characteristics:	
Total Assets	Firm's total assets in $million.
Leverage	Long-term debt divided by total assets.
Market-to-Book	Market value of the firm divided by the book value of assets.
Tangibility	Net property plant and equipment divided by total assets.
Coverage	Interest expenses divided by EBITDA.
Profitability	EBITDA divided by total assets.
Current Ratio	Current assets divided by current liabilities.
Rating	Borrower S&P credit rating.
Debt-to-EBITDA	(Long-term debt + current liabilities) divided by EBITDA.
Loan characteristics:	
Facility Amount	Overall facility volume in $million.
Maturity	Time to maturity in months.
Multiple Tranches	A dummy variable that equals one if the deal consists of more than one tranche and zero otherwise.
Term Loan	A dummy variable that equals one if the loan type is defined as "Term Loan", "Term Loan A ... Term Loan H", or "Delay Draw Term Loan", and zero otherwise.
Secured	A dummy variable that equals one if the loan contains collateral
PSD grid characteristics:	
PSD	A dummy variable that equals one if the loan contract includes a performance pricing provision and zero otherwise.

Continued on next page

Table 10 – continued from previous page

Variable Name	Definition
PSD(Rating)	A dummy variable that equals one if the loan contract includes a performance pricing provision based on the issuer's credit rating and zero otherwise.
PSD(Increasing)	A dummy variable that equals one if $\frac{(S_i - S_{Min})}{(S_{Max} - S_{Min})} < \frac{1}{3}$ and zero otherwise.
PSD(Mixed)	A dummy variable that equals one if $\frac{1}{3} >= \frac{(S_i - S_{Min})}{(S_{Max} - S_{Min})} < \frac{2}{3}$ and zero otherwise.
PSD(Decreasing)	A dummy variable that equals one if $\frac{(S_i - S_{Min})}{(S_{Max} - S_{Min})} >= \frac{2}{3}$ and zero otherwise.
Pricing Steps (#)	Number of pricing steps defined in the pricing grid.
Local Slope	$0.5 * \left(\frac{(S_{i+1} - S_i)}{(Bond_{i+1} - Bond_i)} + \frac{(S_i - S_{i-1})}{(Bond_i - Bond_{i-1})} \right)$
Local Slope ↑	$\frac{(S_i - S_{i+1})}{(Bond_i - Bond_{i+1})}$
Local Slope ↓	$\frac{(S_{i-1} - S_i)}{(Bond_{i-1} - Bond_i)}$
	where:
	i is the borrower's long-term credit rating as of contract inception
	$i + 1$ is the borrower's long-term credit rating as of contract inception plus one notch (upgrade)
	$i - 1$ is the borrower's long-term credit rating as of contract inception minus one notch (downgrade)
	S_i is the spread that the borrower has to pay given rating i
	S_{i+1} is the spread that the borrower has to pay given rating $i + 1$
	S_{i-1} is the spread that the borrower has to pay given rating $i - 1$
	S_{Min} is the lowest spread defined in the pricing grid
	S_{Max} is the highest spread defined in the pricing grid
	Bond refers to the market spread for the respective rating notch
Average Slope	Calculated as Local Slope but over all rating notches defined in the pricing grid.
Average Slope ↑	Calculated as Local Slope ↑, but over all credit ratings above the firm's rating at the time of contract inception.
Average Slope ↓	Calculated as Local Slope ↓, but over all credit ratings below the firm's rating at the time of contract inception.

Optimistic Managers and Corporate Risk Management

Tobias Scheinert

Abstract:

This paper shows that managerial optimism has a significant impact on a firm's hedging policy. Using a panel of derivative usage for S&P 1,500 firms and optimism data of CEOs between 1993 and 2010, we find that overly optimistic CEOs are less likely to use financial derivatives to hedge currency exposures. This behavior is consistent with an underestimation of financial distress costs by optimistic CEOs.

Keywords: Behavioral Corporate Finance; Manager Characteristics; Optimism; Risk Management; Hedging

JEL-Classification: G02, G30, G32

1 Introduction

Examples of failures and misuses in corporate risk management accompanied with severe losses in shareholder value have repeatedly hit the headlines and attracted wide public notice. Whereas these losses could be the result of a perfectly rational risk management strategy solely based on objective company characteristics, quite often this seems not to be the case. Empirical evidence on classical risk management theories examining objective company characteristics as determinants of financial derivative usage, has provided surprisingly little or at best mixed evidence. For example, Brown, Crabb, and Haushalter (2006) find "no evidence that changes in hedge ratios are associated with [...] firm-specific characteristics". On the other hand, managerial characteristics turned out to be important drivers of various financial policy decisions.[1] Managerial characteristics also seem to play a role when firms decide about their risk management activity. According to the 1998 Wharton Risk Management Survey, managers of non-financial companies frequently incorporate their views in risk management decisions.[2] However, it seems unlikely that managers of non-financial firms possess information advantages when they take a view in risk management decisions, especially with respect to FX exposures, which are the subject of this study.[3]

We believe that behavioral biases play an important role in hedging policies of firms. The belief of having a comparative information advantage in

[1] Bertrand and Schoar (2003) find that managerial fixed effects are able to explain heterogeneity in various financial policies, such as the decision to distribute dividends, capital structure decisions, and investment spending.

[2] About 59% alter the timing of a hedge, 61% alter the size of a hedge, and 32% actively take positions when using foreign exchange (FX) derivatives for hedging.

[3] Besides FX exposures, risk management programs generally address interest rate risk exposures and/or commodity price exposures. We focus on FX hedging for several reasons. First, there is too little variation with respect to interest rate exposure, i.e., almost all firms have some exposure to interest rate risk. Second, few firms have a notable commodity exposure. Third, it seems especially unlikely that managers of non-financial firms have a comparative advantage in managing FX risk, while commodity producers may indeed have an information advantage when trading commodity derivatives.

situations where this is rather unlikely stands to reason that managers may overestimate their own abilities in corporate risk management.[4] Managerial optimism has been identified to influence various financial policies. For example, Malmendier and Tate (2008) find that optimistic managers are more likely to conduct mergers and these decisions are often associated with a loss in shareholder value.[5] With respect to corporate risk management, managerial optimism can have an effect through the following channels: First, optimistic managers underestimate the probability of financial distress of their firms and/or attach lower costs to these events. As hedging is costly and as the underestimation of financial distress costs leads to lower perceived benefits of hedging, this may lead to less than optimal hedging by optimistic mangers. Second, as optimistic managers believe that the market undervalues their companies, they view external finance as especially costly. Consequently, optimistic managers prefer to rely on internal resources (Malmendier et al. (2011)). As hedging can be used to shift capital from good to bad states, optimistic mangers would exaggerate the extent of hedging in order to avoid situations where they would need to tap external capital markets. In summary, whereas the first channel predicts a lower probability to hedge by optimistic managers, the opposite is true for the second channel. Which channel prevails is ultimately the empirical question that we aim to address in this paper.

We test our hypotheses using data on FX derivative usage for firms covered by the Standard and Poor's (S&P) ExecuComp database from 1993 to 2010.[6] Hereby, managers are considered to be overly optimistic when they have

[4] It appears unlikely that managers could benefit from information advantages in managing FX risk. This argument is supported by Adam and Fernando (2006) and Brown et al. (2006) who find that positive cash flow gains from selective hedging in the gold-mining industry, where superior information seems to be more likely than in FX markets, are small at best.

[5] In addition, Malmendier and Tate (2005) and Malmendier, Tate, and Yan (2011) identify optimism as an important driver in a firm's leverage and investment policies.

[6] We select this sample because we use ExecuComp in order to construct our optimism measure.

an upwardly biased belief about their firms' future cash flows.[7] As overestimations of a firm's future cash flow are not observable, we follow Malmendier and Tate (2005) and use the executives' stock option exercise behavior in order to classify chief executive officers (CEOs) as optimistic or rational. Managers are classified as optimistic, when they ever hold an option until maturity which is at least 40% in-the-money at the year-end prior to maturity. Derivative data is obtained by using a search algorithm that identifies companies as users or non-users of FX derivative instruments based on statements of derivative usage in the companies' annual reports. Consistent with our first hypothesis, we find that firms managed by optimistic CEOs are significantly less likely to hedge their currency exposures than firms managed by rational CEOs. This finding is consistent with the notion that optimistic CEOs "underhedge" financial exposures as they underestimate the threat of bankruptcy. The difference is also significant in economic terms. Whereas firms with rational CEOs have an average hedging likelihood of about 55%, it is on average about 10% lower for firms with optimistic CEOs.

We contribute to two main strands of the literature. First, we add to the risk management literature by showing that managerial traits significantly affect a firm's hedging policy. Prior literature testing traditional risk management motives generally focuses on company fundamentals as explanatory variables.[8] We highlight that manager characteristics can significantly contribute to the understanding of corporate hedging activity.[9] Second, we contribute

[7] In the literature, the terms overconfidence and optimism have both been used to describe overstated cash flow estimates. We use the term optimism to describe an overestimation of future outcomes, and consider overconfidence as the underestimation of volatility of these outcomes.

[8] See Aretz and Bartram (2010) for an overview.

[9] The papers closest to our study are Beber and Fabbri (2010) and Adam, Fernando, and Golubeva (2012). Beber and Fabbri (2010) show that managerial characteristics such as age and tenure are related to corporate speculation but do not proxy for optimism directly. Adam et al. (2012) analyze the impact of optimism on risk management for a sample of 92 gold mining firms. They document an asymmetric response to past derivative gains and losses and argue that this behavior is consistent with managerial optimism. Instead of investigating the past performance of derivative contracts, our paper focuses on the impact of managerial optimism on classical hedging motives.

to the literature on managerial optimism. More precisely, we show that optimism affects managers in their decision to use financial derivatives and find that firms managed by optimistic CEO are less likely to use derivatives for currency hedging purposes.

Furthermore, to the best of our knowledge, we are the first who document corporate hedging behavior for a fairly large sample over a longer time period. By documenting hedging behavior of S&P 1,500 firms for almost 20 years, we show a general increase in the likelihood to hedge over time. Whereas about 40% of U.S. non-financial firms have used financial derivatives for hedging purposes in the early 1990's, about 60% did so in the late 2000's.

The paper is organized as follows. In Section 2, we develop our empirical predictions. Section 3 discusses the data sample and describes the variables. In Section 4, we present the results. Section 5 presents robustness checks for our results and Section 6 concludes.

2 Empirical Predictions

Companies face the risk that their cash flows will not be sufficient to meet all fixed payment obligations. A company that is not able to meet its obligations is forced into bankruptcy with creditors and shareholders trying to recover their investments in the firm. Even before actual bankruptcy occurs, a troubled firm may face direct and indirect costs of financial distress. Corporate risk management may reduce the probability that a firm is not able to pay back its obligations by reducing the volatility of cash flows. Thereby, corporate risk management is able to lower the expected costs of financial distress (Smith and Stulz (1985)). At the same time, hedging allows a firm to carry more debt and to benefit from greater tax shields (Leland (1998), Myers (1984)).

Because optimistic managers overestimate future cash flows, they underestimate the probability that their firm will run into bankruptcy and thereby underestimate financial distress costs. Overall, optimistic managers underestimate the benefits of hedging and thus, are less likely to do so.

Hypothesis 1: Optimistic managers underestimate the expected costs of financial distress and are therefore less likely to hedge their exposures than rational managers.

Froot, Scharfstein, and Stein (1993) argue that risk management can increase the value of a firm by aligning investment and financing policies. The reasoning is similar to the pecking-order logic by Myers and Majluf (1984): As future cash flows are volatile, internal funds that can be used to finance investment projects vary significantly. In situations where internal funds are not sufficient to finance all positive NPV projects, a firm has two possibilities, either to cut back investment or to rely on external sources that may be expensive due to information asymmetries. As external funds are more costly, fewer projects can be financed. Risk management may transfer funds from states with abundant internal resources to states with scarce internal resources. Thereby, it helps to provide funds when they are needed most and enables the firm to finance its projects with the cheapest funds.

Malmendier et al. (2011) show that optimistic managers view external financing as more costly than rational managers because they overestimate the cash flows of their companies and consider interest rates charged by rational lenders as too high. Thus, optimistic managers are expected to attach a greater importance to internal resources and are therefore more likely to hedge than rational managers.

Hypothesis 2: Optimistic managers view external funds as unduly costly. Thus, in order to avoid the need to tap external capital markets, optimistic mangers are more likely to hedge than their rational counterparts.

3 Sample and Variable Description

We analyze the risk management behavior of firms that are constituents of the S&P 1,500 index at some point between 1993 and 2010. For these firms we collect corporate hedging data as well as information on managerial optimism.

3.1 Optimism Data

We classify CEOs as either optimistic or rational based on their executive stock option exercise behavior. Following Malmendier and Tate (2005), executives are classified as optimistic when they do not exercise options that are at least 40% in-the-money at the year-end prior to maturity.[10] The optimism classification is not time-variant. Thus, following Malmendier and Tate (2005), we threat managerial optimism as an inherent personal characteristic of the respective executive.[11]

Intuitively, executives should exercise their stock options once they are sufficiently deep in-the-money. Delaying the exercise has the benefit of potentially higher exercise prices in the future, however, at the cost of increased idiosyncratic risks. As executives already face large firm specific risk due to their large fraction of equity based compensation, their human capital invest-

[10] The 40% threshold is based on a model by Hall and Murphy (2002) that applies a constant risk aversion parameter of three and 67% wealth invested in company stock. Our results, however, are not sensitive to the choice of the moneyness level (see Section 5.1).

[11] In Section 5.1 we separate our optimism measure into two time periods. Period one refers to the time period before the executive was first identified as optimistic and period two refers to the period thereafter. This procedure mimics the "Pre-Longholder" and "Post-Longholder" measures introduced by Malmendier and Tate (2008). Our resuls indicate that both measures produce qualitativly similar results, which supports the treatment of optimsm as a time-invariant personal trait.

ments into the firm, and their legally constraint diversification abilities, i.e. short selling restrictions on company stock, the costs of delayed exercise seem to outweigh the benefits. Thus, rational CEOs should exercise in-the-money options early in order to diversify their portfolio, while overly optimistic CEOs would fail to do so.

We used ExecuComp in order to obtain information on executive stock option grants, exercised options, and option holdings. Collected data includes the number of options granted, the number of options exercised, exercise prices, and time to maturity. The data gives a fairly comprehensive picture about the executives' option trading behavior and allows for the above described classification into rational and optimistic managers.[12] ExecuComp contains detailed information on option grants, i.e., grant date, exercise date, number of options granted. However, information on option exercises is only given in an aggregated form and not on the grant level. Thus, it is not possible to determine which option package has actually been exercised by the executive. For this reason, we follow Malmendier and Tate (2005) and use the algorithm suggested by Hall and Liebman (1998) to construct a portfolio of option grants held by each executive in a given year.[13] By assuming that the oldest option packages are exercised first, we were able to construct a portfolio of option grants held by the particular executive in a given year, including its exercise date and exercise price. However, the data has several features, which complicate the computation of the option grant portfolios. For details concerning the construction of the option portfolios and the optimism classification we refer the readers to General Appendix (A).

[12] There was a change in disclosure requirements in 2006. Since 2006, corporations disclose the number of options held by a particular executive at fiscal year-end for each particular option grant, including its exercise price and exercise date. This is essentially the information needed to apply the above described optimism classification mechanism. Unfortunately this information is not readily available for the whole sample period.

[13] The analysis by Malmendier and Tate (2005) is based on a hand-collected dataset of Fortune 500 companies, originally collected by Yermack (1995) and transformed into annual option holding portfolios by Hall and Liebman (1998) based on a first-in first-out allocation rule.

Executive stock options have a time to maturity of 10 years on average. Thus, as our optimism classification procedure relies on option holdings until the final maturity year, we can only classify executives that retain their CEO position sufficiently long. To ensure that our sample is not biased towards rational CEOs, we restrict the sample to executives for which we can track option holdings until maturity. Thus, only executives that have a chance to reveal themselfs as optimistic are considered in the analysis. Of 6,598 CEOs that have compensation data in ExecuComp, 1,878 meet all required criteria and actually had the chance to reveal themselves as optimistic.[14] Thereof 1,313 (69.91%) were classified as rational and 565 (30.09%) were classified as optimistic.

3.2 Hedging Data

Several proxy variables are used in the risk management literature to measure hedging on the firm-level. The data used in empirical studies is thereby usually limited to large firms, or certain industries with beneficial data availability and/or well defined risk exposures.[15] In our analysis, we choose to classify firms into users and non-users of currency derivatives in order to proxy for hedging. The advantage of our approach is that it enables us to analyze data for a long time period. At best, we have 18 observations per firm.[16]

[14] There were 2,534 CEOs that did not appear in ExecuComp between 2002 and 2010; 74 executives were dropped due to missing years; 3 CEOs had no CRSP stock price data; 2,109 had no chance to reveal themselves as optimistic or rational due to unavailability of data until option maturity.

[15] For instance, Allayannis and Weston (2001), Géczy, Minton, and Schrand (1997), and Graham and Rogers (2002) use data on foreign currency derivative usage for large firms. Jin and Jorion (2006) or Mackay and Moeller (2007) analyze the extent of hedging by U.S. gas and oil producers. Among others, Adam and Fernando (2006), Brown et al. (2006), and Tufano (1996) use detailed data on derivatives usage in the North American gold mining industry.

[16] Because of changing accounting standards, it is not feasible to collect data on notional values for the whole period between 1993 and 2010. Therefore, we use a binary classification, being aware of the disadvantage of not being able to measure the extent to which a firm hedges.

For our analysis, we use a web crawler program identifying whether a firm uses currency derivatives in a given financial year or not. We first search for keywords to identify text passages in every 10-K, 10-K405, 10-KT, 10KSB, and 10KSB40 report that point to the use of derivative instruments for FX hedging purposes.[17] In case our search routine finds one of the keywords, we extract two lines above and below the line the keyword is found in. Then, in a second step, we filter out text passages that contain the keywords but that are not indicative of derivative usage. These text passages are more *general* in nature. In order to filter out these passages, we manually search 500 annual reports and collect these general expressions.[18] After cleaning for general expressions, we are left with statements that either suggest the usage of derivatives to hedge currency exposures or that contain negative statements suggesting that a firm does *not* use derivatives to hedge currency exposures. If we find positive statements, the firm is categorized as derivative user. If we find negative statements of derivative usage, the firm is categorized as non-user.[19] If we find no statements related to the use of currency derivatives, we classify the firm as non-user in that year.

We conduct this search routine for firms whose executives' compensation is set out in ExecuComp between 1993 and 2010 (3,193 firms). We exclude financials, because their motivation to use derivatives is different, and utilities, because they are subject to considerable regulation. Overall, we are left with 2,496 firms and 23,269 firm-years. Thereof, 1,974 firms (15,726 firm-years)

[17] It total we screen 26,215 single reports for keywords indicating derivatives usage. See Appendix A.1 for the list of keywords used in the screening.

[18] These text passages usually refer to (the adoption of) accounting standards or the description of derivative instruments, but do not state whether a firm actually uses derivatives or not.

[19] For about 20% of the firms, we find both positive and negative statements of derivatives usage. For example, some firms report that they have used currency forwards in the most recent financial year, but that they have *not* used these instruments in previous years. However, the text passages that contain contradictory information where rather individual. Sometimes even a manual inspection could not help to clearify whether the firm uses currency derivatives in the respective fiscal year or not. In order to reduce noise in our dependent variable, we therefore exclude firm-years with contradictory statements on currency derivative usage.

have an exposure to foreign exchange rate risk.[20] For 1,012 firms (7,176 firm-years) there was an inherent foreign exchange rate risk exposure and we were also able to classify the CEO as rational or optimistic. In Table 1 we present summary statistics on hedging per year for the entire sample (All Firms) as well as for firms for which we can classify the CEO as optimistic or rational (Optimism Sample).

[Insert Table 1 here]

As can be seen in Table 1 and Figure 1, the likelihood to use financial derivatives for currency hedging purposes has generally increased over time. Whereas about 40% of U.S. non-financial firms have used financial derivatives for hedging purposes in the early 1990's, about 60% did so in the late 2000's. The general increase can thereby be observed for all firms as well as for firms for which we can classify the CEO as rational or optimistic.[21]

[Insert Figure 1 here]

3.3 Accounting Data

In order to trace the impact of optimism on hedging, we need to control for multiple firm characteristics that may play a role in the decision to hedge.[22] Firms with higher bankruptcy costs for instance should be more likely to hedge in order to avoid distress situations. Proxy variables used in empirical studies include the long-term debt ratio (e.g., Graham and Rogers (2002), Guay (1999), Haushalter (2000)), the interest coverage ratio (e.g., Géczy, Minton,

[20] See Section 3.4 for the identification of FX exposure.

[21] Note that the data becomes more represenatative in the mid 1990s as the number of observations in the earlier years is relatively low compared to later years.

[22] Empirical papers that study why firms use derivatives to hedge include Nance, Smith, and Smithson (1993), Dolde (1993), Mian (1996), Tufano (1996), Géczy et al. (1997), Gay and Nam (1998), Allayannis and Ofek (2001), Haushalter (2000), Graham and Rogers (2002), Bartram, Brown, and Fehle (2009).

and Schrand (2007), Nance et al. (1993)), short-term liquidity (inverse) (e.g., Bartram et al. (2009), Mian (1996), Tufano (1996)), credit ratings or credit risk spreads (Haushalter (2000)), profitability (Allayannis and Ofek (2001)), predicted default probabilities such as the Altman (1968) Z-score or asset tangibility (Bartram et al. (2009)). Also firms with higher dividend yields, which typically have steady cash flows, should be less likely to face financial distress. We use leverage, interest coverage, quick ratio, profitability, and dividend payments as general firm characteristics to discriminate between financially sound and strained firms. In addition we use the firm's "distance-to-default (DTD)", proposed by Crosbie and Bohn (2003), in order to proxy for a firm's probability of financial distress. This measure is based on a structural default model by Merton (1974), which views equity as a call option on the firm's assets. It uses information on public market prices and volatilities and thus gives a more timely information on the financial health of the firm than could be provided by accounting data. Empirically it has been shown that DTD measures contain significant predictive power concerning a firm's bankruptcy incidence (Vassalou and Xing (2004), Hillegeist, Keating, Cram, and Lundstedt (2004), and Agarwal and Taffler (2008)) and that changes in DTD can predict credit rating changes (Aggarwal, Singh, and Thomas (2012), Oderda, Dacorogna, and Jung (2003), and Kealhofer (2003)). Nevertheless, accounting measures sill contain useful information to predict default and should be used jointly with the DTD (Hillegeist et al. (2004) and Agarwal and Taffler (2008)).[23]

According to Froot et al. (1993), firms with high underinvestment costs have an incentive to hedge as it reduces the need to tap costly external capital markets. Empirically, the task is to identify companies for which underinvestment cost are most likely an issue. These firms are likely to be companies that are financially constraint. Past studies often measure the amount of finan-

[23] As a robustness we also repeat our analysis using the S&P credit rating and the Altman Z-score. The choice of the risk proxy does not affect our main result.

cial constraints by using research and development (R&D) expenditures (e.g., Dolde (1993) or Lin and Smith (2007)) or by using the market-to-book (MTB) ratio (e.g., Gay and Nam (1998)). The reasoning is that firms with more expenditures on R&D have less stable incomes and more intangible assets. Firms with higher MTB ratios also have fewer tangible assets and are less likely to be able to provide collateral when borrowing. Furthermore, high R&D expenditures and MTB ratios indicate large growth opportunities that need to be financed. We use both variables, R&D-To-Sales as well as MTB in our analysis. Additionally, underinvestment cost might be more severe for companies that have on the one hand significant opportunities for future growth but that are on the other hand already highly levered (Géczy et al. (1997)). For this reason we additionally use the interaction of R&D-To-Sales with leverage and MTB with leverage in our empirical analysis.

Furthermore, firm size is an important determinant of the decision to hedge. While theoretically smaller firms could be more likely to hedge as they face greater bankruptcy risks (Gruber and Warner (1977)) and because they benefit more from hedging due to larger information asymmetries (DeMarzo and Duffie (1995)), empirical research has continuously reported a positive relationship between hedging and firm size. The dominant explanation for this finding is economies of scale (Graham and Rogers (2002) and Nance et al. (1993)), whereupon large firms face a better cost-benefit relation from engaging in a hedging program than small firms. We use the log of total assets in order to control for firm size in our empirical analysis.

Taxes provide a further rational why firms hedge. Smith and Stulz (1985) argue that for firms with convex tax functions, volatile taxable income results in a higher tax burden than steady taxable income. If corporate hedging reduces the volatility of taxable income, it may lower the average tax burden. Many empirical studies test if tax-function convexity is related to the probabil-

ity of hedging. Proxy variables used in these studies include dummy variables that are equal to one if a company's marginal tax rate falls into the progressive region of the tax structure (e.g., Haushalter (2000)), the marginal tax rate itself (e.g., Haushalter (2000)), the existence of tax credits (e.g., Bartram et al. (2009), Nance et al. (1993)), Mian (1996)), and tax-loss carryforwards (e.g., Gay and Nam (1998), Géczy et al. (2007), Tufano (1996)). Graham and Rogers (2002) argue that proxies such as tax credits or tax-loss carryforwards do not adequately measure if companies are encouraged or discouraged to hedge.[24] They propose to explicitly measure tax convexity by simulating changes in the expected tax liability that result from reducing the volatility of sales revenues or taxable income.[25] We follow Graham and Smith (1999) and Graham and Rogers (2002) in measuring tax incentives to hedge.

3.4 Exposures

The likelihood to use financial derivatives for hedging purposes is naturally dependent on the existence of an exposure to foreign currency risk. Firms whose cash flows are not affected by changes in foreign exchange rates have no need to use FX derivatives for hedging purposes. Consequently, we limit our analysis to firms that have an exposure to foreign exchange rate risk. This limitation ensures that firms are identified as non-users because they voluntarily decide not to hedge instead of not hedging because of no exposure to foreign exchange rate risk.[26] We follow Géczy et al. (1997) and Purnanandam (2008) to identify firms that are exposed to foreign currency risk. Thereby, we classify firms as being exposed that i) report sales in non-domestic geographical segment in the Compustat Segment Files for the fiscal year or with +\- one year,

[24] In particular, Graham and Rogers (2002) argue that existing tax-loss carryforwards provide only an incentive to hedge if firms expect future profits, however, they provide disincentives to hedge if firms expect future losses.

[25] Graham and Rogers (2002) and Graham and Smith (1999) simulate a reduction of volatility of five percent, the volatility reduction observed by Guay (1999) when firms introduce a hedging program.

[26] Our results are literally unchanged when we control for foreign exchange exposure instead of limiting the analysis to firms with an exposure.

ii) firms that report foreign pretax income, iii) firms that report foreign taxes or foreign deferred taxes, iv) firms that report foreign currency adjustments, and v) firms that report to use currency derivatives to hedge exchange rate risk. The correlation between our exposure dummy and currency derivative usage is 0.436, significant at the one-percent level, suggesting a proper identification. As can be seen in Table 2, also in a multivariate setting our exposure variables show a significant impact on the decision to use FX derivatives, both in statistic and economic terms.

[Insert Table 2 here]

3.5 Descriptive Statistics

In Table 3, we present summary statistics for our control variables. Panel A depicts the entire sample. Panel B reports statistics separately for firms managed by rational CEOs and optimistic CEOs. Column 4 reports p-values of a t-test for differences in means and column 7 reports Mann-Whitney-Wilcoxon rank-sum tests between both types of firms.

[Insert Table 3 here]

As we focus on the S&P 1,500, our sample firms are rather large. The mean BV of total assets is about $6.3 billion, the median is $1.2 billion. The average DTD is about 2.7, which means the average net worth of a firm is as large as 2.7 standard deviations of its asset value. The average interest coverage ratio is 61.6 and the average quick ratio is 1.8. Thus, sample firms are financially sound on average. Firms can save on average more than $2 million in taxes by using financial derivatives to reduce their taxable income. The average market value of a firm is more than twice as high as its book value and firms invest on average seven percent of its sales in research and development.

When comparing firm characteristics between firms with rational CEOs and firms with optimistic CEOs, we see that there are statistically significant differences between both groups. Economically, however, most firm characteristics are not strikingly different between both types of firms. The average DTD is somewhat higher for firms managed by optimistic CEOs, however, both being on a fairly high level. Interest coverage and quick ratio are slightly lower for firms with optimistic CEOs. Leverage ratio, profitability, and dividend payouts are similar for both types of firms. Thus, there is no clear indication that firms managed by either type of CEO are more or less financially sound than the other type. Also, while the MTB ratio is slightly higher, R&D expenditures are slightly lower on average for firms managed by optimistic CEOs than for firms managed by rational CEOs. Thus, also in terms of potentially costly external financing needs there is no striking difference between both groups. When MTB or R&D are interacted with leverage, however, we see potentially higher financing costs for firms with optimistic CEOs. With respect to potential tax savings from hedging, firms with optimistic managers show smaller benefits than firms with rational managers. However, hedging benefits due to tax savings still amount to more than $1.8 million on average.

4 Results

4.1 Univariate Analysis

In Table 4, we test if firms with optimistic CEOs use currency derivatives more or less frequent to hedge their exposures than firms with rational CEOs. The t-tests show that firms managed by optimistic CEOs hedge significantly less than firms managed by rational CEOs. This is consistent with our first prediction, whereupon optimistic managers should hedge less than rational managers as they are less concerned about financial distress.

[Insert Table 4 here]

The same conclusion can also be derived graphically. Figure 2 shows the proportion of firms that use financial derivatives for currency hedging purposes between 1993 to 2010. As can be seen, in all but one year fewer firms with optimistic CEOs use currency derivatives than firms with rational CEOs. Figure 2 also visualizes the general increase in the propensity to hedge over time. The increasing trend can thereby be observed for firms with rational CEOs as well as for firms with optimistic CEOs.

[Insert Figure 2 here]

4.2 Multivariate Analysis

In this section, we analyze the relationship between managerial optimism and the likelihood to use currency derivatives for hedging purposes in a multivariate setting. Theoretically, optimistic CEOs could be less likely to hedge as they ascribe a lower probability and/or a lower cost of financial distress to their firms than their rational counterparts. Alternatively, optimistic CEOs could be more likely to hedge than rational CEOs as they consider their firms to be undervalued and consequently hedge to avoid the need to raise costly external capital. We employ the following probit model to test the relationship between FX hedging and CEO optimism:

$$Pr\left(Hedge_{it} = 1\right) = probit\left(\alpha + \beta * Optimistic_{it} + \gamma * X'_{it}\right) \qquad (1)$$

The dependent variable, $Hedge$, is a dummy variable that equals one if the firm uses financial derivatives for currency hedging purposes in the respective fiscal year and zero otherwise. $Optimism$ is a dummy variable that

equals one if the firm's CEO is classified as optimistic and zero otherwise. X are control variables. We mainly follow Bartram et al. (2009) in the choice of firm control variables.[27] Additionally, we use the firms' distance-to-default to control for potential bankruptcy costs and we follow Graham and Smith (1999) and Graham and Rogers (2002) to control for tax incentives to hedge. The regressions furthermore include time and industry dummy variables (based on two-digit SIC codes) when indicated. All variables are defined in Table 10.

Table 5 reports our results. Coefficient estimates are given as marginal effects, making it possible to analyze the economic significance of the respective variables on the decision to hedge.

[Insert Table 5 here]

When we examine the impact of optimism on hedging, we find that firms with optimistic CEOs are significantly less likely to hedge than firms with rational CEOs. The economic magnitude of optimism is about 10%, i.e., firms with optimistic CEOs are about 10% less likely to use derivatives than firms with rational managers, which is large considering the mean hedging likelihood of about 55% for firms with rational CEOs. Thus, the result lends support to our first hypothesis, which predicts a negative impact of optimism on the hedging likelihood of a firm, potentially because managers underestimate the threat of financial distress.

After indicating the importance of managerial optimism on the decision to hedge, we briefly describe the results for our control variables. Consistent with the prior literature we find that firm size is significantly positively related to the decision to hedge. Tax considerations also seem to influence the decision to hedge. For every million dollar that a firm saves in taxes by reducing the

[27] In particular we use log total assets, leverage ratio, interest coverage, quick ratio, profit margin, cash dividends, MTB, and the interaction of MTB and leverage as control variables.

volatility of their taxable income by five percent, the firm is one percent more likely to hedge. The financial distress argument is supported by the quick ratio coefficient, which has a significantly negative effect on FX derivative usage. The other control variables, however, are not statistically significant. Looking at MTB times leverage furthermore shows no significant relationship of potentially large underinvestment costs on the decision to hedge.[28]

4.3 Adressing Endogeneity

Table 5 shows that firms with optimistic CEOs are significantly less likely to use FX derivatives for hedging purposes than firms with rational CEOs. So far, however, our results could be driven by unobservable firm characteristics that are correlated with the type of the CEO as well as with the decision to hedge FX risk. To mitigate this concern, we extend the preceding analysis by including firm fixed effects. The fixed effects regression measures within-firm variation in the likelihood to hedge FX risk by behavioral type of CEO and alleviates concerns that our results are driven by time-invariant unobservable firm characteristics. As can be seen in Table 6, firms that are managed by optimistic CEOs are still significantly less likely to hedge FX risk than firms managed by rational CEOs. The relative likelihood to hedge FX risk between rational and optimistic CEOs is not only statistically significant but also economically sizable, indicated by an odds-ratio of about 0.3.[29] The results for the control variables confirm the prior findings. Firm size is positively related and quick ratio is negatively related to the likelihood to hedge. Furthermore, leverage is significantly positively related to the decision to hedge, giving additional support to the financial distress argument of hedging. On the contrary, DTD is also positively related to hedging, which is counterintuitive as a larger

[28] Using R&D-To-Sales as well as its interaction with leverage instead of MTB and MTB x leverage gives similar results.

[29] We report results in form of odds ratios since conditional fixed effects logit regression models do not provide estimates for the individual firm fixed effects, which are needed to compute marginal effects (see for instance Katz (2001), King (2001), and Coupé (2005)).

DTD indicates more financially sound firms that have less need to hedge from a financial distress point of view. Tax savings, are not significant anymore in the fixed effects regression framework.

[Insert Table 6 here]

4.4 Subsample Analysis

In spirit of Bartram et al. (2009) we create subsamples of firms for which specific risk management motives should be more/less applicable. Doing so enables us to test the relative importance of the financial distress cost and the underinvestment cost motives for hedging in firms with optimistic managers and rational managers more directly. We separate our sample into these two groups and compare their likelihood to hedge in firms with high financial distress costs and in firms with high underinvestment costs. Our first empirical prediction is that firms with optimistic managers should be less likely to hedge than their rational counterparts as they underestimate the likelihood and the cost of financial distress. Our second empirical prediction is that for firms with high potential underinvestment costs, firms with optimistic managers should hedge more than firms with rational managers as they view external capital as unduly costly. We use various proxy variables for financial distress costs and underinvestment costs to verify the robustness of our results. Furthermore we use several cut-off points for the severity of financial distress and underinvestment costs. The first line for each proxy variable separates firms at the median value, e.g., firms with a DTD below median are classified as firms with high financial distress costs and firms with a MTB x leverage above the median value are considered to be firms with large underinvestment costs. The second line for each proxy variable uses the bottom (top) 25th percentile to identify firms with high financial distress costs (underinvestment costs). The third and forth line use the bottom and top 10th percentile and 5th percentile respectively.

Our empirical prediction concerning the financial distress motive is confirmed by all three proxy variables. Firms with optimistic CEOs hedge significantly less than firms with rational CEOs. With rating as financial distress cost identifier the effect becomes even stronger the tighter the classification is, i.e., the lower the S&P rating is. For DTD the difference is significant at all boundaries, for Altman Z-score the effect becomes weaker for more tight financial distress costs, i.e., lower z-scores, and is insignificant for the bottom 5th percentile. Our analysis with respect to underinvestment costs gives mixed results. While firms with a MTB x leverage above median are significantly less likely to hedge when they have an optimistic CEO than when they have a rational CEO, the effect becomes smaller and eventually reverses at more stringent classification levels. For firms in the top 5th percentile 56.1% of the firms with optimistic CEOs are likely to hedge compared to 51.6% of firms with rational CEOs. The difference is not significant however. By using R&D x leverage to proxy for underinvestment costs a similar picture can be observed, however, differences are not statistically significant. Again separating at the median shows that firms with optimistic CEOs hedge less than those with rational CEOs. By selecting a more tight classification, i.e., at the top 25th or 10th percentile, however, the result reverses. At the top 5th percentile firms with rational CEOs are more likely to hedge. Thus, there is some support for our prediction that optimistic managers believe that their firms are undervalued and consider external financing as especially costly, particularly for firms with high underinvestment costs.

[Insert Table 7 here]

5 Robustness

5.1 Alternative Optimism Measures

In this section, we examine the robustness of our results to the used optimism classification measure. Table 8 reports the marginal effects for the same probit regression as shown in Table 5 but uses alternative identification parameter for CEO optimism. Alternative 1, alternative 2, and alternative 3 classify manager as optimistic if they ever hold an option until the final maturity year that is at least 10%, 70%, or 100% in the money respectively. The original moneyness threshold is 40%, thus, the reported parameters represent both, more loose and more stringent moneyness requirements. Similar to the study of Malmendier and Tate (2008), alternative moneyness requirements yield similar results and thus confirm our previous findings. Firms with optimistic CEOs are significantly less likely to use derivatives to hedge FX risk than firms with rational CEOs.

Alternative 4 investigates whether optimism can indeed be considered as a time-invariant personal characteristic. It uses the original optimism classification measure and separates it into the time period before the manager first held an option until the final maturity year, which is at least 40% in the money (*Pre-Longholder*) and the time period thereafter (*Post-Longholder*). As can be seen, for both time periods there is a significantly negative effect on the likelihood to hedge, giving support to the treatment of optimism as a time-invariant behavioral feature and confirming our previous finding that optimistic CEOs are less likely to hedge than their rational counterparts.

Alternative 5 does not use stock options to classify managers as optimistic or rational but uses the Sen and Tumarkin (2009) measure of voluntary stock holdings instead. The rational for this measure is similar to the option

classification. Executives are considered to be optimistic if their total stock holdings are larger than the median of the ratio stock holdings-to-salary. Given that executives are typically highly exposed to firm specific risk and are not especially well diversified, they should hold only as much company stock as necessary. If they voluntary hold more stock, they are likely overly optimistic with respect to the future performance of their firms. However, firms often have minimum stock holding requirements in place for their key executives and these minimum holdings are often stated in terms salary multiples (Core and Larcker (2002)). For this reason we follow Sen and Tumarkin (2009) and classify CEOs as optimistic if their stock holdings-to-salary multiple is larger than the median of this ratio. Again our results are robust to the alternative optimism classification measure and firms with optimistic CEOs are significantly less likely to hedge FX exposures.

[Insert Table 8 here]

5.2 CEO Characteristics

In this section we examine whether there are other CEO characteristics that are related to the likelihood to use FX derivatives. Table 9 mirrors Table 5 but includes further observable manager characteristics. Model 1 adds a dummy variable that equals one if the CEO is female *(Female)*, a dummy variable that equals one if the CEO holds a Ph.D. degree *(Ph.D.)*, the age of the CEO *(Age)*, and the time in days since the executive became CEO *(Tenure)*. As can be seen, none of these additional characteristics help to explain a firm's decision to hedge and only optimism shows a significantly negative relationship.

Model 2 accounts for portfolio incentives of the manager. We follow Core and Guay (2002) in computing sensitivities of a manager's stock and stock option portfolio with respect to changes in the stock price (Delta) and

stock return volatility (Vega). The delta of the managers' portfolios in a given year are the sum of the delta of the stocks they own and the aggregated delta of their option positions. The delta for stock is equal to one by definition, the delta of option holdings are computed based on the first derivative of the Black and Scholes (1973) option value with respect to the stock price for each option position.[30] Following Tchistyi, Yermack, and Yun (2011), we scale the total delta by the number of common shares outstanding to compute the sensitivity relative to the market capitalization of the firm. This sensitivity measures the proportion of the total market value gain realized by a one-dollar change in the stock price that the manager receives through his stock and option holdings. For the computation of the managers' vega, we only need to take into account the vega of their option portfolios since the vega for stock is usually close to zero.[31] The vega of the stock option portfolio is the sum of the vega of each option position, calculated as the derivative of the Black and Scholes (1973) option price with respect to volatility. Controlling for delta and vega does not affect our finding concerning CEO optimism. Firms with optimistic CEOs remain significantly less likely to hedge FX risk. Furthermore delta is negatively related to the likelihood to hedge, which is consistent with the idea that increases in risk provide larger benefits to CEOs whose portfolios have a large sensitivity to stock price movements.

Model 3 combines model 1 and 2 and includes all six additional CEO characteristics. Again optimism is significantly negatively related to the likelihood to hedge currency exposures. Besides optimism, only the Ph.D. dummy shows a weak positive relationship. Delta is still negatively related to the likelihood to hedge, however, it is not statistically significant anymore. Overall

[30] For the calculation of the delta and vega, we use the one-year stock return volatility estimated based on stock price data from CRSP as a proxy for future volatility and the 10-year U.S. Treasury rate from the Federal Reserve as a proxy for the risk-free rate.

[31] While in theory, the vega of stock may be different to zero, Guay (1999) finds that the mean vega of an executive's options is 0.167 while the mean vega of his stocks is 0.005. Thus, we assume that the vega of the stocks in our managerial portfolios is zero.

it appears that managerial optimism is an important determinant in a firm's decision to hedge, which is distinct to other observable personal characteristics.

[Insert Table 9 here]

5.3 CFO Optimism

Besides the CEO, the CFO, who is responsible for financial decisions in the firm, might also play an important rule in a firms hedging decision. Tufano (1996) for instance documents a relationship between manager characteristics and risk management activity in the gold mining industry, not only for the CEO but for the entire management team. To test for the impact of the CFO we run additional regressions using a dummy variable that equals one if the CFO is classified as optimistic and zero otherwise. In untabulated results, we find no significant relationship between our CFO optimism dummy and the hedging likelihood. There are several possible explanation for this result. First, it might be the case that it is the CEO who decides whether to hedge or not, in general. The CFO might be more directly involved with the day to day financing decisions, or to what extent to hedge certain exposures given that the firm hedges in general. Our binary hedging variable cannot capture these finer degrees of hedging activity. Second, our optimism classification method might be more suitable for the CEO than for other members of the management team. Even if a CFO is indeed optimistic, holding company options particularly long might still not be in his or her best interest as firm performance is strongly affected by decisions of other management members, especially the CEO.

6 Conclusions

In this paper, we provide a link between managerial optimism and corporate hedging. By using a panel of derivative usage and CEO optimism, we find that firms with optimistic CEOs are significantly less likely to use

financial derivatives to hedge FX exposures than firms with rational CEOs. This finding is in line with the argument that optimistic managers underestimate the likelihood and costs of financial distress and are thus less inclined to reduce company risks. Our finding is robust to the inclusion of firm fixed effects, which mitigates concerns that unobservable firm characteristics simultaneously determine the behavioral type of the manager and the decision to hedge. Furthermore we provide more direct evidence on the relative importance of prevalent risk management motives. By separating our sample into subgroups of firms with rational and optimistic CEOs, we find that in firms for which financial distress costs are particularly important those with optimistic CEOs are significantly less likely to hedge than those with rational CEOs. For firms with particularly high underinvestment costs, there is some evidence that firms with optimistic CEOs are more likely to hedge than firms with rational managers, which is in line with our second empirical prediction. Overall, however, the negative impact of optimism seems to dominate and firms with optimistic CEOs are less likely to hedge than firms with rational CEOs.

Besides our evidence on the importance of managerial optimism on corporate hedging, we contribute to the risk management literature by documenting hedging behavior for a sizable sample over a longer time period. For firms that were listed on the S&P 1,500 index, we observe a general increase in the proportion of firms that use financial derivatives for FX hedging purposes. In the early 1990's about 40% of U.S. non-financial firms hedge their FX exposures. In the late 2000's more than 60% do so. The increasing trend can thereby be observed for firms with rational CEOs as well as firms with optimistic CEOs. Despite the incresing trend, however, in all but one year fewer firms hedge when their CEO is optimistic than when their CEO is rational.

Overall, our results reveal that not only a firm's investment and financing decisions but also its risk management activity is strongly influenced by

manager characteristics. This finding helps to explain why the existing empirical risk management literature generally finds little or at best mixed evidence for prevalent risk management theories. Looking at company characteristics alone seems to be insufficient to explain a firm's risk management behavior and the consideration of manager characteristics can significantly contribute to the understanding of observed hedging practices.

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Appendix

A.1 Hedging Identification

A.1.1 Hedging Keywords

We scan all 10-K, 10-K405, 10-KT, 10KSB, and 10KSB40 of our sample firms and save each text passage that contains one of the following keywords:

hedge; hedging; derivative; risk management; swap; notional; futures; forwards; forward contract; forward sale; forward purchase; forward delivery sale; forward stock purchase; forward exchange transaction; forward exchange option; forward exchange contract; forward exchange agreement; forward-exchange transaction; forward-exchange option; forward-exchange contract; forward-exchange agreement; currency exchange forward; currency exchange option; currency exchange contract; currency exchange agreement; currency forward; currency option; currency contract; currency agreement; foreign exchange forward; foreign exchange option; foreign exchange contract; foreign exchange agreement; forward rate

For general expressions such as hedge, hedging etc. we additionally screen for keywords that indicate a foreign currency relation.

A.1.2 Further Keywords and Adjustments

Within the text passages that contain our above mentioned keywords, we screen for more more than 1,000 additional expressions that indicate 1) misleading keywords, i.e., expressions such as "SONIC THE **HEDGE**HOG" that our initial keywords would wrongly flag as hedging activity, 2) general expressions, i.e., statements that describe certain risk management standards or regulatory changes but do not refer to actual hedging activity, and 3) nega-

tive statements, i.e., statements that actually refer to the non-use of derivative instruments.

In a further step, we exclude contradictory observations for which we have both positive as well as negative statements on derivative usage. Finally, we manually check all firms that have switched their hedging behavior more than five times within our sample period and update the classification if necessary.

A.2 Figures

Figure 1: Hedging Over Time

This figure shows the proportion of firms that use financial derivatives for currency hedging purposes. The straight line represents all firms with foreign exchange rate risk exposure. The dashed line represents all firms with foreign exchange rate risk exposure for which the CEO could be classified as optimistic or rational.

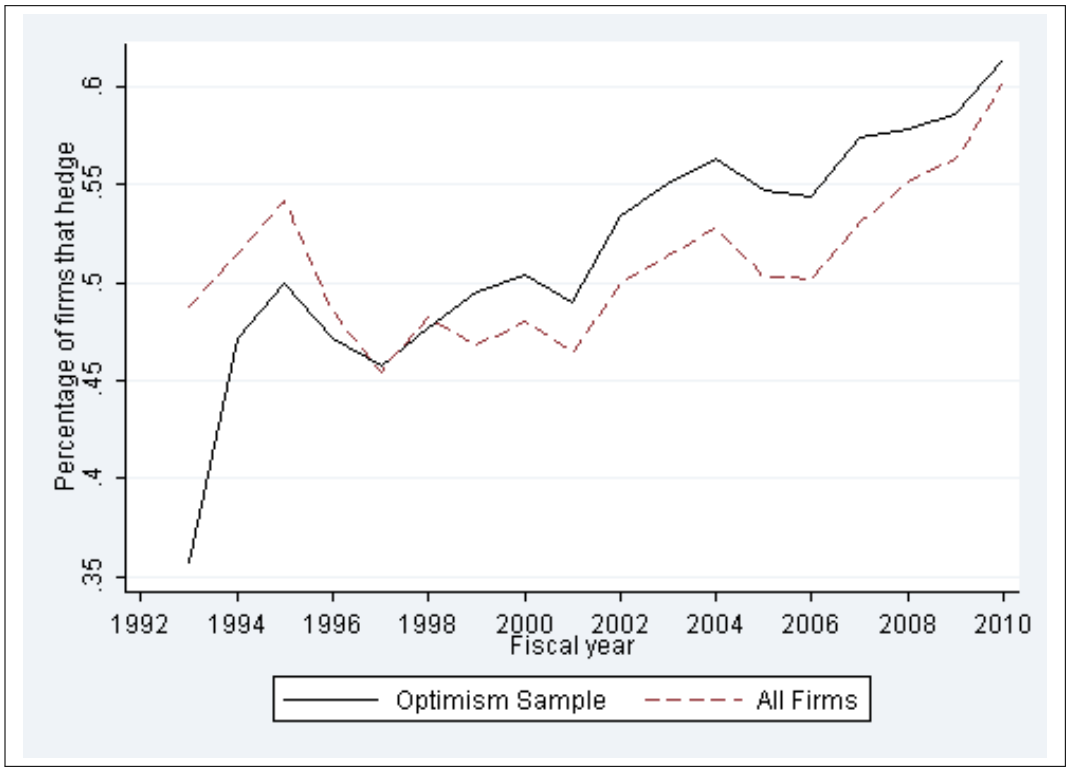
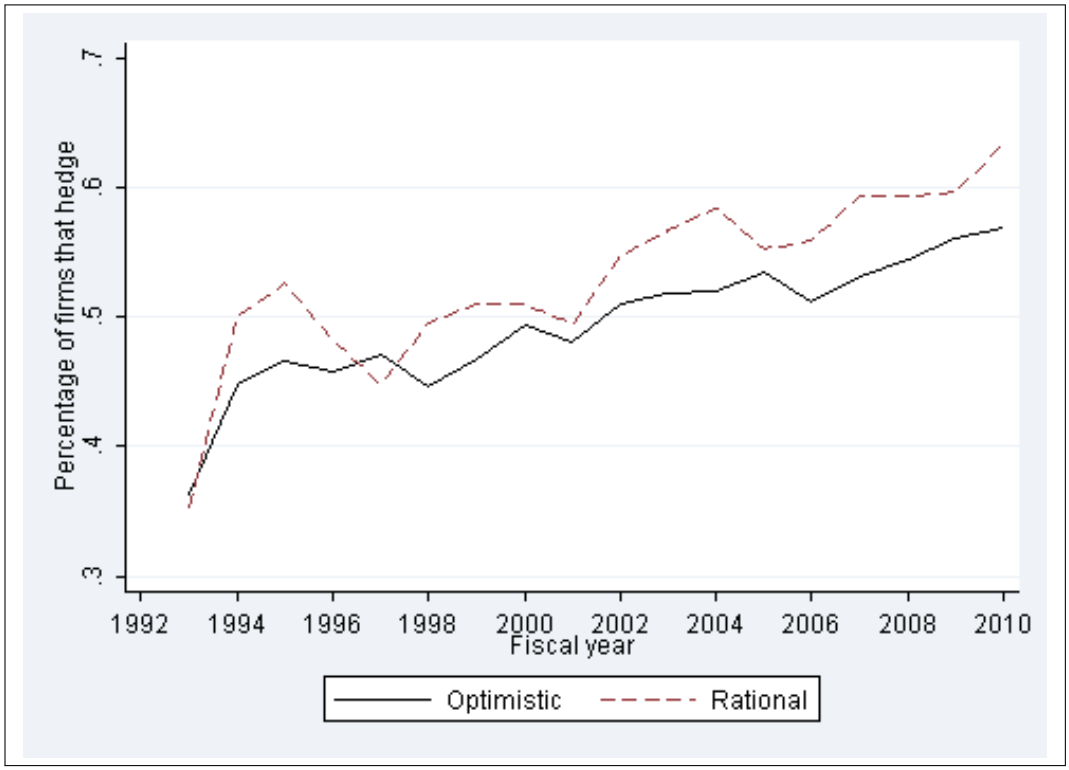


Figure 2: Hedging Over Time - Optimistic CEOs vs. Rational CEOs

This figure shows the proportion of firms that use financial derivatives for currency hedging purposes. The straight line represents all firms with optimistic CEOs and the dashed line represents all firms with rational CEOs.



A.3 Tables

Table 1: Descriptive Statistics - Hedging Data

This table shows descriptive statistics on FX derivative usage between fiscal year 1993 and 2010. Column 2-4 refer to all firms that have an exposure to foreign exchange rate risk. Column 5-7 refer to all firms for which the CEO can additionally be classified as optimistic or rational.

	All Firms			**Optimism Sample**		
	N	**Hedge**	**SD**	**N**	**Hedge**	**SD**
1993	404	0.49	0.5005	56	0.36	0.4835
1994	408	0.51	0.5004	70	0.47	0.5028
1995	736	0.54	0.4986	170	0.50	0.5015
1996	1,016	0.49	0.5000	246	0.47	0.5002
1997	1,058	0.45	0.4982	306	0.46	0.4990
1998	1,050	0.48	0.4999	350	0.48	0.5002
1999	1,064	0.47	0.4992	432	0.50	0.5006
2000	981	0.48	0.4999	480	0.50	0.5005
2001	882	0.46	0.4990	467	0.49	0.5004
2002	983	0.50	0.5003	576	0.53	0.4992
2003	972	0.51	0.5001	579	0.55	0.4978
2004	964	0.53	0.4995	577	0.56	0.4964
2005	928	0.50	0.5003	541	0.55	0.4982
2006	914	0.50	0.5003	531	0.54	0.4985
2007	897	0.53	0.4993	507	0.57	0.4950
2008	859	0.55	0.4976	468	0.58	0.4942
2009	817	0.56	0.4963	413	0.59	0.4932
2010	793	0.60	0.4896	407	0.61	0.4874
Total	15,726	0.51	0.5000	7,176	0.53	0.4988

Table 2: Foreign Exchange Exposure

This table reports the marginal effects for probit regressions using a dummy variable as the dependent variable that equals one whenever a firm uses financial derivatives to hedge FX risk in the respective year and zero otherwise. *Foreign Sales* is a dummy variable that equals one if the firm reports sales in a non-domestic segment in the current fiscal year, the previous year, or the following year and zero otherwise. *Foreign PI* is a dummy variable that equals one if the firm reports foreign pretax income in the fiscal year and zero otherwise. *Foreign Taxes* is a dummy variable that equals one if the firm reports foreign taxes or foreign deferred taxes in the fiscal year and zero otherwise. *Foreign Currency Adj.* is a dummy variable that equals one if the firm reports foreign currency adjustments in the fiscal year and zero otherwise. The regressions include time fixed effects, industry fixed effects, and firm characteristics when indicated. Firm characteristics refer to all control variables included in Table 5. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. P-values are given in parentheses. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	**(2)**	**(3)**	**(4)**
Foreign Sales	0.246***	0.248***	0.242***	0.252***
	(0.000)	(0.000)	(0.000)	(0.000)
Foreign PI	0.185***	0.184***	0.180***	0.130***
	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Taxes	0.167***	0.166***	0.187***	0.115***
	(0.000)	(0.000)	(0.000)	(0.000)
Foreing Currency Adj.	0.121***	0.118***	0.114***	0.125***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	21,397	21,397	21,314	14,286
Pseudo R^2	0.244	0.245	0.283	0.378
Year Fixed Effects	No	Yes	Yes	Yes
Industry Fixed Effects	No	No	Yes	Yes
Firm Characteristics	No	No	No	Yes

Table 3: Descriptive Statistics

This table reports descriptive statistics for firm characteristics. Panel A shows summary statistics for the total sample, i.e., for all firms that have an exposure to foreign exchange rate risk and for which the CEO can be classified as rational or optimistic. Panel B shows mean and median values separately for firms managed by rational CEOs and for firms managed by optimistic CEOs. Column 4 of panel B reports p-values for t-tests of differences in means and column 7 of panel B reports p-values for Wilcoxon rank-sum (Mann-Whitney) test for the respective variables. All variables are defined in Table 10.

Panel A: Firm Characteristics

	N	Mean	Std. Dev	Min.	Max.	Median
Total Assets (billion USD)	7,151	6.336	19.028	0.007	297.754	1.230
Tax Savings	7,098	2.122	3.982	-20.664	27.722	1.978
Leverage	7,133	0.210	0.189	0.000	1.104	0.191
Interest Coverage	6,189	61.562	291.289	-335.854	2,852.407	7.066
Quick Ratio	6,981	1.832	1.908	0.074	14.688	1.256
Profit Margin	7,141	0.136	0.304	-4.611	0.753	0.140
Dividend	7,092	0.011	0.020	0.000	0.211	0.001
Distance-To-Default (DTD)	5,682	2.653	1.498	-3.591	7.980	2.391
Market-to-Book (MTB)	7,095	2.176	1.586	0.666	11.880	1.674
MTB x Leverage	7,089	0.400	0.660	0.000	13.119	0.300
R&D-to-Sales	7,176	0.070	0.254	0.000	5.862	0.010
R&D-to-Sales x Leverage	4,270	0.028	0.240	0.000	6.474	0.004

Panel B: Firm Characteristics - Optimistic vs. Rational

	Mean (R)	Mean (OC)	p-value	Median (R)	Median (OC)	p-value
Total Assets (billion USD)	6.935	5.165	0.000	1.167	1.328	0.182
Tax Savings	2.277	1.821	0.000	2.189	1.552	0.000
Leverage	0.210	0.210	0.486	0.192	0.191	0.431
Interest Coverage	66.66	51.880	0.029	6.464	7.995	0.000
Quick Ratio	1.872	1.753	0.007	1.268	1.236	0.169
Profit Margin	0.137	0.133	0.279	0.140	0.140	0.257
Dividend	0.011	0.012	0.209	0.001	0.001	0.221
Distance-To-Default (DTD)	2.588	2.774	0.000	2.316	2.537	0.000
Market-to-Book (MTB)	2.146	2.236	0.012	1.642	1.726	0.000
MTB x Leverage	0.381	0.438	0.000	0.291	0.312	0.001
R&D-to-Sales	0.074	0.063	0.044	0.012	0.007	0.000
R&D-to-Sales x Leverage	0.025	0.037	0.063	0.003	0.005	0.000

Table 4: Hedging Policy of Firms with Rational vs. Optimistic CEOs

This table shows the fraction of firms that use financial derivatives for FX hedging purposes separately for firms with rational CEOs (row 1) and for firms with optimistic CEOs (row 2). CEOs are classified as optimistic if they ever hold company options until the final maturity year that are at least 40% in-the-money. Row 3 shows the difference in the fraction of FX hedging between both types of firms as well as the p-value of the difference.

	% Hedge	**Observations**	**P-Value**
Rational CEO	54.97	4,748	
Optimistic CEO	50.54	2,428	
(Difference)	4.44		0.0004

Table 5: Optimistic CEOs and Hedging

This table reports the marginal effects for probit regressions using a dummy variable as the dependent variable that equals one whenever a firm uses financial derivatives to hedge FX risk in the respective year and zero otherwise. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the firm's CEO is classified as optimistic and zero otherwise. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. P-values are given in parentheses. The regressions include time and industry dummies when indicated. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Panel A: Optimism Classification				
Optimistic	−0.057*	−0.077**	−0.097***	−0.096***
	(0.085)	(0.024)	(0.007)	(0.007)
Panel B: Firm Characteristics - General				
Size	0.139***	0.175***	0.137***	0.137***
	(0.000)	(0.000)	(0.000)	(0.000)
Tax Savings	0.006**	0.007**	0.007**	0.007**
	(0.027)	(0.011)	(0.038)	(0.028)
Panel C: Firm Characteristics - Financial Distress				
Leverage			−0.133	−0.050
			(0.119)	(0.710)
Interest Coverage			0.000	0.000
			(0.254)	(0.404)
Quick Ratio			−0.058***	−0.059***
			(0.000)	(0.000)
Profit Margin			0.054	0.034
			(0.360)	(0.532)
Dividend			0.025	0.025
			(0.481)	(0.479)
Distance-To-Default			0.007	0.007
			(0.517)	(0.481)
Panel D: Firm Characteristics - Underinvestment				
MTB				0.016
				(0.217)
MTB x Leverage				−0.033
				(0.319)
Observations	7,078	7,028	5,105	5,104
Pseudo R^2	0.127	0.217	0.223	0.223
Year Fixed Effects	No	Yes	Yes	Yes
Industry Fixed Effects	No	Yes	Yes	Yes

Table 6: Optimistic CEOs and Hedging

This table reports the odds ratios for fixed effects logit regressions using a dummy variable as the dependent variable that equals one whenever a firm uses financial derivatives to hedge FX risk in the respective year and zero otherwise. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the firm's CEO is classified as optimistic and zero otherwise. All variables are defined in Table 10. P-values are given in parentheses. The regressions include time dummies when indicated. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Panel A: Optimism Classification				
Optimistic	0.244***	0.303***	0.288**	0.293**
	(0.000)	(0.004)	(0.012)	(0.013)
Panel B: Firm Characteristics - General				
Size	4.268***	2.307***	2.327***	2.165***
	(0.000)	(0.000)	(0.000)	(0.000)
Tax Savings	1.033**	1.006	1.006	1.011
	(0.022)	(0.665)	(0.765)	(0.585)
Panel B: Firm Characteristics - Financial Distress				
Leverage			2.592	6.610**
			(0.129)	(0.032)
Interest Coverage			1.001	1.001
			(0.135)	(0.125)
Quick Ratio			0.863*	0.880*
			(0.051)	(0.094)
Profit Margin			1.641	2.033
			(0.436)	(0.280)
Dividend			1.073	1.128
			(0.801)	(0.668)
Distance-To-Default			1.188**	1.214***
			(0.015)	(0.007)
Panel B: Firm Characteristics - Underinvestment				
MTB				0.991
				(0.928)
MTB x Leverage				0.714
				(0.168)
Observations	2,846	2,846	2,150	2,150
Pseudo R^2	0.113	0.147	0.198	0.201
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	Yes

Table 7: Subsample Analysis - Optimistic vs. Rational CEO

This table shows the mean and standard deviation for FX derivatives usage separately for firms with optimistic and rational CEOs. Column 7 shows the p-values of tests of differences between both groups assuming a binomial distribution of FX derivatives usage. Panel A reports derivative usage for firms with high costs of financial distress. Firms with high financial distress costs are defined as 1) firms with an Altman's Z-score a) below median, b) below the 25th percentile, c) below the 10th percentile d) below the 5th percentile; 2) firms with a Distance-to-Default a) below median, b) below the 25th percentile, c) below the 10th percentile, d) below the 5th percentile; 3) firms with a S&P Rating a) below median, b) below the 25th percentile, c) below the 10th percentile, d) below the 5th percentile. Panel B reports derivative usage for firms with high underinvestment costs. Firms with high underinvestment costs are defined as 1) firms with Market-to-Book x Leverage a) above median, b) above the 75th percentile, c) above the 90th percentile, d) above the 95th percentile; 2) firms with a R&D-To-Sales x Leverage a) above median, b) above the 75th percentile, c) above the 90th percentile, d) above the 95th percentile.

		Cost						
		Optimistic			**Rational**			**p-**
		N	**Mean**	**SD**	**N**	**Mean**	**SD**	**value**
Panel A: Financial Distress Costs								
Financial Distress	<p50	1,093	0.536	0.499	2,393	0.598	0.490	<0.001
(Z-Score)	<p25	405	0.523	0.500	1,337	0.590	0.492	0.009
	<p10	121	0.430	0.497	576	0.538	0.499	0.015
	<p5	66	0.364	0.485	282	0.404	0.492	0.272
Financial Distress	<p50	894	0.478	0.500	1,947	0.542	0.498	0.001
(DTD)	<p25	414	0.469	0.500	1,007	0.533	0.499	0.013
	<p10	155	0.445	0.499	413	0.516	0.500	0.067
	<p5	74	0.351	0.481	210	0.519	0.501	0.006
Financial Distress	<p50	543	0.571	0.495	1,117	0.588	0.492	0.251
(Rating)	<p25	191	0.450	0.499	501	0.545	0.498	0.013
	<p10	48	0.292	0.459	135	0.563	0.498	0.001
	<p5	26	0.385	0.496	65	0.692	0.465	0.003
Panel B: Underinvestment Costs								
Underinvestment	>p50	1,247	0.557	0.497	2,297	0.625	0.484	<0.001
(MTB x Leverage)	>p75	639	0.563	0.496	1,133	0.609	0.488	0.030
	>p90	270	0.530	0.500	438	0.566	0.496	0.171
	>p95	139	0.561	0.498	215	0.516	0.501	0.204
Underinvestment	>p50	742	0.652	0.477	1,393	0.675	0.469	0.147
(R&D-To-Sales x	>p75	366	0.596	0.491	702	0.591	0.492	0.444
Leverage)	>p90	142	0.500	0.502	285	0.446	0.498	0.144
	>p95	59	0.356	0.483	154	0.377	0.486	0.390

Table 8: Alternative Optimistic Classifications

This table reports the marginal effects for probit regressions using a dummy variable as the dependent variable that equals one whenever a firm uses financial derivatives to hedge FX risk in the respective year and zero otherwise. *Optimistic 10*, *Optimistic 70* and *Optimistic 100* are indicator variables that equal one if the CEO of the borrower is classified as optimistic, i.e. if the CEO ever held an option until the final maturity year, which is at least 10%, 70%, or 100% respectively in the money and zero otherwise. *Pre-Longholder* and *Post-Longholder* indicate the time period before an executive ever held an option until the final maturity year, which is at least 40% in the money and the time period after this activity, respectively. Voluntary Holder is an indicator variable that equals one if the CEO voluntarily holds more company stocks than required by company constitutions. The regressions furthermore include all control variables used in Table 5. All other variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. P-values are given in parentheses. The regressions include time and industry dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Optimistic (10)	−0.079**				
	(0.034)				
Optimistic (70)		−0.076*			
		(0.040)			
Optimistic (100)			−0.101**		
			(0.042)		
Pre-Longholder				−0.107**	
				(0.042)	
Post-Longholder				−0.085**	
				(0.042)	
Voluntary Holder					−0.071*
					(0.042)
Observations	5,104	5,104	5,104	5,104	5,010
Pseudo R^2	0.222	0.221	0.222	0.223	0.218
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table 9: CEO Characteristics

This table reports the marginal effects for probit regressions using a dummy variable as the dependent variable that equals one whenever a firm uses financial derivatives to hedge FX risk in the respective year and zero otherwise. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the firm's CEO is classified as optimistic and zero otherwise. *Female* is a dummy variable that is equal to one if the CEO is female. *Ph.D.* is a dummy variable if the CEO holds a Ph.D. degree. *Tenure* is the time in days since the executive became CEO. *Delta* measures the sensitivity of the CEO's overall option and stock portfolio to price movements of the company's stock. *Vega* measures the sensitivity of the CEO's overall option and stock portfolio to volatility changes of the company's stock. The regressions furthermore include all control variables used in Table 5. All variables are defined in Table 10. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. P-values are given in parentheses. The regressions include time and industry dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	**(2)**	**(3)**
Optimistic	−0.086**	−0.083**	−0.083**
	(0.018)	(0.021)	(0.025)
Female	−0.117		−0.115
	(0.258)		(0.303)
Ph.D.	0.120		0.131*
	(0.113)		(0.085)
Age	−0.002		−0.002
	(0.543)		(0.505)
Tenure	−0.002		−0.001
	(0.355)		(0.707)
Delta		−0.800*	−0.493
		(0.057)	(0.275)
Vega		−0.006	−0.007
		(0.347)	(0.309)
Observations	5,018	4,888	4,805
Pseudo R^2	0.228	0.222	0.226
Control Variables	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes

Table 10: Variable Definitions

Variable Name	Definition
FX Exposure:	
FX Exposure	A dummy variable that equals one if i) the firm reports sales in non-domestic geographical segments in the Compustat Segment Files for the fiscal year or with +\- one year, ii) if the firms reports foreign pretax income in the fiscal year, iii) if the firms reports foreign taxes or foreign deferred taxes in the fiscal year, iv) if the firm reports foreign currency adjustments in the fiscal year, or v) if the firm reports to use currency derivatives to hedge exchange rate risk in the fiscal year and zero otherwise.
Foreign Sales	A dummy variable that equals one if the firm reports sales in non-domestic geographical segments in the Compustat Segment Files for the fiscal year or within +\- one year and zero otherwise.
Foreign PI	A dummy variable that equals one if the firm reports foreign pretax income in the fiscal year and zero otherwise.
Foreign Taxes	A dummy variable that equals one if the firm reports foreign taxes or foreign deferred taxes in the fiscal year and zero otherwise.
Foreign Currency Adj.	A dummy variable that equals one if the firm reports foreign currency adjustments in the fiscal year and zero otherwise.
Managerial Characteristics:	
Optimistic	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 40% in-the-money and zero otherwise.
Optimistic (10)	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 10% in-the-money and zero otherwise.
Optimistic (70)	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 70% in-the-money and zero otherwise.
Optimistic (100)	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 100% in-the-money and zero otherwise.

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Variable Name	Definition
Pre-Longholder	A dummy variable that equals one in the time period before a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Post-Longholder	A dummy variable that equals one in the time period after a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Voluntary Holder	A dummy variable that equals one if $\frac{Stock\ Holdings}{Salary} >= Median(\frac{Stock\ Holdings}{Salary})$ and zero otherwise, where: *Stock holding*s is the value of company stock held by the CEO in $million. *Salary* is the CEO salary in $million.
Female	A dummy variable that equals one if the CEO is female.
Ph.D.	A dummy variable that equals one if the CEO holds a Ph.D. degree.
Age	Age of the CEO in years.
Tenure	Time in days since the executive became CEO.
Delta	Overall delta of the option and stock portfolio held by the CEO divided by total shares outstanding. The individual stock delta is one per definition, the delta of an individual option is defined as $e^{-dT}N(Z)$.
Vega	$e^{-dT}N^{'}(Z)ST^{1/2} * (0.01)$. In our regressions we use $log(1 + vega)$ to correct for the skewness of vega. where: $Z = \left[ln\left(S/X\right) + T\left(r - d + \sigma^2/2\right)\right]/\sigma T^{1/2}$ $N =$ is the cumulative probability function for the normal distribution $N^{'}$ is the normal density function. S is the price of the underlying stock. X is the exercise price of the option. σ is the expected stock-return volatility over the life of the option. r is the natural logarithm of the risk-free rate.

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Table 10 – continued from previous page

Variable Name	Definition
	T is the time to maturity of the option in years.
	d is the natural logarithm of expected dividend yield over the life of the option.
Firm Characteristics:	
Hedge	A dummy variable that equals one if a firm uses derivatives to hedge foreign currency risk in a given year and zero otherwise.
Size	Firm's total assets in log $million.
Tax Savings	$4.88 + 7.15 * TI_{NEG} + 1.6 * TI_{POS} + 0.019 * VOL - 5.50 * RHO - 1.28 * ITC + NOL * (3.29 - 4.77 * TI_{NEG} - 1.93 * TI_{POS})$ where:
	TI_{NEG} is a dummy variable that equals one if the firm has taxable income between -$500,000 and $0 and zero otherwise.
	TI_{POS} is a dummy variable that equals one if the firm has taxable income between $0 and $500,000 and zero otherwise.
	VOL is the absolute coefficient of variation for taxable income.
	RHO is the first-order autocorrelation coefficient for taxable income.
	ITC is a dummy variable that equals one if the firm has investment tax credits and zero otherwise.
	NOL is a dummy variable that equals one if the firm has net operating loss carry-forwards and zero otherwise.
Leverage	Debt in current liabilities plus long-term debt divided by total assets.
Interest Coverage	EBIT divided by interest expense.
Quick Ratio	Cash and cash equivalents divided by current liabilities.
Profit Margin	EBITDA divided by total sales.
Dividends	Cash dividends paid divided by total assets.
Distance-To-Default	A market-based measure of default risk based on KMV / Merton methodology as described in Crosbie and Bohn (2003): $(V_A - D) / (V_A - \sigma_A)$. where:
	V_A is the market value of assets.

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Table 10 – continued from previous page

Variable Name	Definition
	D is current liabilities plus one-half long-term debt.
	σ_A is the one-year asset volatility.
	V_A and σ_A are unobservable, but are approximated by using the market value of equity (V_E), the one-year equity volatility (σ_E), the three-month treasury bill rate (r), and debt (D) and solving the Merton (1974) model of pricing a firm's debt and equity for a one-year time horizon ($T = 1$):
	$V_E = V_A * N(d_1) - e^{-rt} * D * N(d_2)$
	$\sigma_E = (V_A/V_E) * N(d_1) * \sigma_A$ where:
	$d_1 = \left[ln\left(V_A/D\right) + \left(r + 0.5 * \sigma_A^2\right) * T\right] / \left[\sigma_A * \sqrt{T}\right]$
	$d_2 = d_1 - \sigma_A * \sqrt{T}$
	$N()$ is the the cumulative normal distribution.
Z-Score	$(1.2 *$ working capital $+ 3.3 * EBIT + 0.999 * sales)$/total assets
Rating	The firm's S&P Credit Rating.
MTB	(Market value of equity plus book value of debt) divided by total assets.
MTB x Leverage	MTB multiplied by book leverage.
R&D-To-Sales	Research and development expenses divided by total sales.
R&D-To-Sales x Leverage	R&D-To-Sales multiplied by book leverage.

Big Bath Accounting - The Bright Side of Managerial Overoptimism

Valentin Burg Jochen Pierk Tobias Scheinert

Abstract:

This paper empirically investigates the relationship between managerial optimism and write-offs following CEO turnover. Subsequent to managerial turnover, it is often observed that large one-time charges are used to decrease current earnings for the benefit of higher future earnings. This earnings management technique, commonly referred to as big bath accounting, facilitates the reaching of given future earnings targets. Overly optimistic managers overestimate their abilities and consequently have upwardly biased expectations concerning future firm cash flows. Based on this premise, we hypothesize that optimistic CEOs see less need to engage in an earnings bath following managerial change in order to boost future earnings. Our empirical results strongly confirm this hypothesis showing that earnings baths are significantly less frequent among optimistic CEOs. The abstinence from downward earnings manipulation by optimistic CEOs thereby constitutes one of the few documented examples of a bright side of managerial optimism.

Keywords: Big Bath Accounting, Earnings Management, Managerial Characteristics, Optimism

JEL-Classification: M40, M41, G30

1 Introduction

Overoptimism has a bad reputation, and, as it seems, for a good reason.[1] Empirical evidence so far shows that decisions made by overly optimistic CEOs have mostly adverse consequences for their firms' stakeholders. Malmendier and Tate (2008), for instance, show that overly optimistic CEOs are more active but less successful in the M&A market. Schrand and Zechman (2012) provide evidence that optimistic CEOs engage in fraudulent financial reporting.[2] However, are there also circumstances when managerial overoptimism can be beneficial? Contrary to the general notion, we argue that CEO overoptimism can also have a positive flavor by showing that when optimistic executives are hired, they are less likely to use write-offs to manipulate earnings.

Subsequent to CEO turnover, it is often observed that incoming CEOs use large write-offs and attribute these losses to their predecessors. This behavior is commonly known as taking a big bath, highlighting the magnitude of these write-offs. Big bath accounting thereby represents a manipulation intended to shift earnings to the future where gains are attributed to the new CEO. Overly optimistic CEOs, however, underestimate the benefits of this behavior because they overestimate future earnings in line with their behavioral bias (i.e., they believe that they will reach their earnings targets regardless of a potential earnings bath).[3] However, even though optimistic CEOs place a lower value in engaging in big bath accounting, they might still be inclined to do so if it would not be accompanied with any risks or costs. Yet, there are large potential costs associated with this type of earnings management. De-

[1] In the following we treat the terms overoptimism and optimism interchangeably.

[2] Other papers that document negative consequences of CEO overoptimism include Malmendier and Tate (2005) and Adam, Burg, Scheinert, and Streitz (2014). Malmendier and Tate (2005) show that overly optimistic CEOs decrease investment in positive NPV projects when they have to rely on external finance and Adam et al. (2014) document that optimistic CEOs are more likely to use performance sensitive debt and perform worse after the issuance of these debt contracts.

[3] Analysts seem to be unable to consistently predict earnings management and thus cannot use this behavior in their forecasts (Burgstahler and Eames (2003)).

sai, Hogan, and Wilkins (2006), for instance, document serious labor market consequences for managers after earnings restatements.[4] Dechow, Sloan, and Sweeney (1996) and Hribar and Jenkins (2004) show that firms face large capital market costs after revelations of earnings manipulation.[5] Consequently, managers face a trade-off between potential costs and benefits in the decision to engage in earnings manipulations. As optimistic managers place a lower value on the benefits of big bath accounting, we expect them to be less likely to engage in such activities in the year of the turnover.

We empirically investigate this prediction by examining CEO turnover of large U.S. companies.[6] Hereby, we use the ExecuComp database to build up managers' executive stock option portfolios following Yermack (1995) and Hall and Liebman (1998) in order to identify CEOs as either optimistic or rational. The methodology is based on Malmendier and Tate (2005). Managers are classified as optimistic if they ever hold an option until maturity which is at least 40 percent in-the-money at the year-end prior to maturity. The rationale behind this is that executives are typically poorly diversified and should exercise executive options as soon as possible in order to reduce their exposure to firm-specific risk. We merge the data on managerial optimism with control variables from Compustat and Lexis Nexis.

[4] These consequences include a significantly larger probability of being replaced as well as poorer prospects for future employment.

[5] Hribar and Jenkins (2004) found large increases in the cost of capital after earnings restatements. Dechow et al. (1996) report a large decline in market value, increased bid-ask spreads, a drop in analysts following, and an increase in the dispersion of analysts' forecast after earnings manipulation has been made public.

[6] We focus on big bath accounting around turnover for several reasons. First, empirical evidence indicates that big bath accounting is used more frequently around CEO turnover (Johnson, Lopez, and Sanchez (2011)). Second, big bath accounting is not only used more frequently but it is also more extreme around turnover (Strong and Meyer (1987)). Third, the turnover setting allows us to control for time-invariant unobservable firm characteristics that might endogenously determine the use of big bath accounting. Fourth, big bath accounting during turnover allows the incoming CEO to blame poor performance on the predecessor, while taking credit for future increases in performance. This benefit is not available for big bath accounting outside of a turnover setting.

Our results provide strong support for our empirical prediction. We show that firms engage less in big bath accounting after hiring an optimistic CEO. Following Elliott and Shaw (1988), we use the magnitude of write-offs in the form of special items to measure big bath accounting and find that optimistic CEOs use fewer negative special items to decrease earnings in the turnover year.

An alternative explanation could be that there is a self-selection of optimistic managers into firms with lower potential for large write-offs in the turnover year. We address this potential endogeneity concern in several ways. First, we show that the observed differences between the two manager types are not driven by the fact that a management change is routine or non-routine. Big bath accounting has been shown to be especially prevalent in non-routine turnover (Pourciau (1993); Wells (2002)). Thus, by controlling for and conditioning on the turnover type we rule out the possibility that our results are driven by a self-selection of optimistic CEOs into routine turnover. Second, we use a propensity score matching (PSM) design in which the first stage models the choice to hire an optimistic manager. This mitigates concerns that firm characteristics simultaneously explain the choice to hire a CEO of a certain behavioral type and determine the predicted big bath accounting pattern. Third, we run a second propensity score matching model based on firms with similar potential for large write-offs in the turnover year. The matching results rule out that our findings are driven by a selection of rational CEOs into firms with overvalued assets and consequently higher big bath accounting potential. And fourth, we ensure that our results are not driven by optimistic CEOs failing to execute justified large write-offs in the turnover year. If that was the case, a necessary restructuring would be only delayed, leading to a greater likelihood of large write-off usage in future periods. Our results indicate that this is not the case.

Our contribution to the literature is twofold. First, we contribute to the literature by revealing a new factor that shapes large write-offs following CEO turnover: Optimistic CEOs are less likely to engage in big bath accounting. The existing literature on earnings management at CEO turnover documents that incoming managers take a big bath and write down assets to ascribe negative outcomes to their predecessors (Murphy and Zimmerman (1993)). To the best of our knowledge, we are the first to link this behavior to managerial traits.

Second, the finding that optimistic CEOs are less likely to manipulate earnings via big bath accounting is one of the first examples that managerial overoptimism can be beneficial. We are aware of two other empirical papers highlighting positive effects of managerial overoptimism: Hirshleifer, Low, and Teoh (2012) demonstrate that optimistic CEOs are better innovators, while Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011)) show that moderate overoptimism leads to first-best investment decisions.

Besides us, few studies have analyzed the influence of CEO optimism on accounting policies.[7] Schrand and Zechman (2012) document that overoptimism is related to financial misreporting and fraud and Hribar and Yang (2013), Libby and Rennekamp (2012), and Hilary and Hsu (2011) show that optimistic managers are more likely to engage in management forecasts and that their forecasts are more specific and optimistic. Ahmed and Duellman (2013) find that firms managed by optimistic CEOs use less conservative accounting and delay loss recognition.

The remainder of this paper is organized as follows. Section 2 develops our empirical hypotheses. Section 3 introduces the research methodology. In

[7] Some papers relate other personal characteristics of CEOs to accounting policies. For example, Francis, Huang, Rajgopal, and Zang (2008) show that firms with more reputable CEOs have poorer earnings quality.

Section 4 we interpret our results and Section 5 presents robustness tests. Section 6 concludes.

2 Empirical Predictions

Optimistic managers systematically overestimate their abilities and consequently the future cash flows they are able to generate with their firms.[8] This implies that they place a higher value on the company than rational market participants.[9] Ahmed and Duellman (2013) show that the perceived superior ability by optimistic managers induces them to choose less conservative (i.e., more aggressive) accounting.

However, we argue that managerial optimism has additional effects on accounting choices which do not necessarily result in more aggressive accounting. In particular, we are interested in management actions following CEO turnover. Pourciau (1993) finds that incoming managers decrease earnings in their first year in order to report higher earnings in the following years and ascribe these write-offs to the former manager. This behavior is commonly known as "taking a big bath", highlighting the magnitude of these write-offs. We argue that optimistic managers are less likely to take a big bath. Taking a big bath is beneficial for incoming CEOs as they will be able to report increased earnings in the future. The cost of taking a big bath, however, is that the firm (i) has to provide additional information about the respective special item, (ii) exhibits increased SEC scrutiny, (iii) has less accounting flexibility in future years, (iv) will have excessive negotiation with the auditor and (v) faces severe labor market and capital market costs when the earnings manipula-

[8] The terms overconfidence and optimism have been used inconsistently in the literature. We define managerial optimism to mean that the executive consistently overestimates the firm's future expected cash flows.

[9] The perceived increase in firm value is thereby independent of whether or not the incoming CEOs have already exerted effort in managing the firm. Current firm value reflects the discounted stream of expected future cash flows. Thus, as optimistic managers have upwardly biased beliefs with respect to future cash flows, the value they place on the company immediately exceeds the current market value.

tion is made public.[10] Therefore, the incoming CEO faces a trade-off between costs and benefits of big bath accounting. Optimistic CEOs overestimate their ability relative to other managers (e.g., their predecessors) and consequently believe that the company's projects will realize higher earnings in the future when these projects are managed by them. Therefore, they are certain of reaching their earnings targets (e.g., avoid the zero benchmark, meet and beat analysts' or management forecasts, reach bonus payment thresholds, etc.) and thus underestimate the necessity of increasing future earnings by large write-offs today. Thus, optimistic managers do not believe that the benefits will outweigh the costs and are less likely to engage in big bath accounting.

Hypothesis: Incoming optimistic CEOs are less likely to engage in big bath accounting compared to incoming rational CEOs.

One potential concern might be that optimistic managers might still have an incentive to use big bath accounting as this leads to an even larger increase in future earnings and consequently even to an over-achievement of pre-set earnings targets.[11] However, over-achievement of these targets is typically unfavorable as this might entail an upward revision of future requirements such as higher earnings targets or higher bonus payment thresholds according to Weitzman (1980) (ratchet effect). Empirical research is generally consistent with this conjecture and shows for instance that firms manage earnings to closely match analyst forecasts (Dechow and Skinner (2000)), to report positive

[10] See for example Dechow et al. (1996), Desai et al. (2006) and Hribar and Jenkins (2004). Hereby SEC scrutiny is not limited to upward earnings manipulations. Badertscher, Phillips, Pincus, and Rego (2009) for instance report that about 20 percent of firms with misstated reports that resulted in SEC investigation used income decreasing manipulations. In Nelson, Elliott, and Tarpley (2003) the percentage of income decreasing earnings management approaches detected by auditors even amounts to 38 percent.

[11] There is usually an asymmetric reaction concerning the reaching vs. not reaching of future goals such as the meeting of analyst targets or the reporting of positive earnings. Thus, there are strong negative consequences of not reaching these targets.

earnings (Burgstahler and Dichev (1997)) or to meet bonus payment thresholds (Healy (1985)).

3 Data and Research Methodology

3.1 Measurement of Optimism

We follow Malmendier and Tate (2005) and construct our optimism measure based on executive option holdings.[12] An executive is classified as optimistic when he or she ever holds an option until maturity which is at least 40 percent in-the-money at the year-end prior to maturity.[13] Thus, optimism is considered a personal trait of the executive that does not vary over time.[14] Several other studies employ proxies for managerial optimism that are also related to the moneyness of the managers' stock options but do not require that a manager holds options until the last year of maturity. In particular, Schrand and Zechman (2012) classify managers as optimistic if the value of their exercisable options is higher than the industry median in a given year. We choose the measure used by Malmendier and Tate (2005) because it does not require to classify 50% of all managers as optimistic. Furthermore, it is more directly related to the individual executives as the classification is based on trading behavior of personal option portfolios.[15]

[12] We use ExecuComp to obtain information on executive stock option grants, exercised options, and option holdings. For details concerning the construction of the option portfolios and the optimism classification algorithm see General Appendix A and Hall and Liebman (1998).

[13] Hall and Murphy (2002) derive the moneyness threshold using a constant relative risk-aversion parameter of three and 67 percent of wealth in company stock.

[14] In their study of CEO optimism on acquisitions, Malmendier and Tate (2008) separated the optimism measure into two alternative measures to allow for time variation in the optimism classification. The first measure "Post-Longholder" is a dummy variable equal to one in all years after the CEO was classified for the first time as optimistic according to the above-described algorithm. The second measure "Pre-Longholder" is equal to one for the years before the CEO was first classified as optimistic. As shown in Section 5, our results hold with these alternative classifications.

[15] We test if our results hold if we use the measure proposed by Schrand and Zechman (2012) as a robustness check.

The rationale for relying on the executive's option exercise behavior as a means of classification into rational or optimistic managers is the following: Executives face a trade-off between exercising their options and retaining the options for later use. By retaining the options, they maintain the right to purchase company stock at potentially more favorable conditions in the future. The downside of this strategy is that it involves substantial costs for the executive in terms of exposure to idiosyncratic risk. Executive stock options typically have a maturity of ten years and become vested after two to four years. This means an executive cannot sell the options for several years. Furthermore, diversifying the exposure is problematic as executives are legally prohibited from short-selling their company's stock in the U.S. Given the large proportion of personal wealth tied to their company, diversification abilities across alternative investments are also limited. Lastly, besides the financial exposure, substantial human capital is also tied to the company (Malmendier and Tate (2008)). Consequently, executives can be considered as under-diversified investors who have large exposure to their company's risk. Thus, a rational executive should divest as soon as the option is sufficiently in-the-money because the cost of delayed exercise typically exceeds its option value. In contrast, an executive who is optimistic about the firm's future return would not exercise stock options in these situations.

3.2 Measurement of Big Bath Accounting

Following Elliott and Shaw (1988), all firm-years with special items (SPI, Compustat item #17) less than minus one percent of total assets are classified as big bath accounting years. Special items include any non-recurring items, impairment of goodwill, non-recurring inventory write downs, bad debt expense, restructuring expense, and provisions for doubtful accounts.[16] Al-

[16] In our sample about 75% of special items consists of asset write downs, goodwill impairment and restructuring costs (i.e., components where management has a particularly large valuation leeway).

though a non-discretionary element exists, it is likely to be clustered around time, not around CEO turnover. It might be that due to economic downturns or other exogenous shocks (e.g., natural disasters) special items occur predominantly in a specific year. This should not have an impact in our setting as the CEO changes are distributed over a time span of 11 years for both groups (optimistic vs. rational) and both groups are approximately equally distributed over time.

3.3 Control Variables

Besides the main variable of interest we include the following control variables which could influence earnings management behavior. We use Compustat to collect data on firm characteristics for the five years before and after CEO turnover.

Firm Performance

Prior research suggests that weak firm performance is related to more aggressive earnings management. If current firm performance is poor, earnings are shifted from the future to the current period (e.g., DeFond and Park (1997); Keating and Zimmerman (1999)). Furthermore, performance could be mechanically linked to the magnitude of special items since poor performance might trigger extraordinary write-offs. To control for firm performance we include return on assets (ROA), which is EBIT (Compustat item #178) divided by total assets (Compustat item #6) at the beginning of the year.

Firm Size

The size of the firm could also affect the earnings management behavior of managers. Skinner (1993), for example, shows that the size of the firm increases the likelihood of income-decreasing depreciation procedures. It might be that big bath accounting is related to the size of the company since more

visible firms behave differently with respect to earnings manipulation. Size is measured as the natural logarithm of total assets in billion dollars.

Debt

The leverage ratio of a firm is related to debt covenant violations. Various papers show that earnings are manipulated before and after debt covenant violations (e.g., DeFond and Jiambalvo (1994); Sweeney (1994)). Covenant violations are most often triggered by exceeding pre-set debt levels. Thus, we control for Leverage in all regressions and define Leverage as total debt (Compustat item #142) divided by total assets at the beginning of the year.

Market-to-Book Ratio

Missing of earnings benchmarks such as analyst forecasts can be particularly severe for high-growth firms (Skinner and Sloan (2002)), giving those firms an especially strong incentive for earnings manipulations. To control for growth opportunities, we include the market-to-book ratio (MTB) in our regressions. MTB is equal to the market value of a company's assets (Compustat item #199 times item #25 plus item #10 plus item #181) divided by the book value of a company's assets (Compustat item #6).

Corporate Governance

Weak internal control systems are often correlated with poor earnings quality (Doyle, Ge, and McVay (2007)). In order to account for the impact of corporate governance mechanisms on earnings management, we include the "Entrenchment Index (E-Index)" proposed by Bebchuk, Cohen, and Ferrell (2009). As a robustness check, we also use the Gompers, Ishii, and Metrick (2003) governance index (G-Index).

Managerial Compensation

Earnings-based compensation of CEOs provides several incentives to manipulate earnings. Holthausen, Larcker, and Sloan (1995) for instance show that managers engage in income-decreasing earnings management when bonus schemes are at their maximum. Bergstresser and Philippon (2006) point out that earnings manipulations are especially prevalent if compensation is closely tied to firm value. We collect information about CEO compensation (bonus and salary) from ExecuComp. Bonus is defined as the annual bonus payment divided by the sum of bonus and salary.

Routine vs. Non-Routine CEO Turnover

Pourciau (1993) and Wells (2002) show that big bath accounting is especially pronounced after non-routine turnover because in these cases negative outcomes can be attributed easily to the manager who has left the firm in discord. We hand-collect data on routine and non-routine turnover following Hazarika, Karpoff, and Nahata (2012).[17]

3.4 Model Specification

Sample Selection

Since executive stock options typically have long maturities (on average 10 years), only a limited number of executives have the chance to show overoptimism. This means that the sample consists of executives who hold the CEO position for a long time period. Executives, who are only active for a few years, cannot be classified because there is no information in ExecuComp as to whether these executives hold an option package until maturity. In order to avoid a bias towards rational executives, we limit our sample to those

[17] A managerial turnover is classified as non-routine "if (i) the CEO was fired, forced out from the position, or departed due to policy differences; or (ii) the departing CEO's age is less than 60, and the announcement does not report that the CEO died, left because of poor health, or accepted another position elsewhere or within the firm; or (iii) the CEO 'retires' but leaves the job within six months of the 'retirement announcement' " (Hazarika et al. (2012, p.47)).

executives who have the chance to reveal themselves as optimistic or not.[18] Furthermore, we delete financial institutions from the sample because of their special asset and thus impairment structure.

We limit our sample to CEOs who stayed in post for at least five full years after the CEO turnover. Therefore, we ensure that the respective CEO can benefit from potential big bath accounting. Furthermore, we require our sample to have sufficient data prior to the turnover to control for abnormal earnings pattern before the new CEO steps in. Thus, we follow prior research and focus on an eleven-year window surrounding CEO turnover (Dechow and Sloan (1991); Murphy and Zimmerman (1993)).

In total we consider 398 CEO changes. Of the 398 incoming CEOs, 272 (68.34 percent) are classified as rational and 126 (31.66 percent) are classified as optimistic.[19] We do not condition on the type of the predecessor for two reasons. First, our optimism identification method allows us to classify only a limited number of these CEOs.[20] Second and more importantly, knowledge of the behavioral type of the predecessor does not affect our empirical predictions and would, if anything, only make our empirical results stronger. Consider first the case where the predecessor is rational. If the successor is also rational, our hypothesis predicts that the successor will take a big bath. If the successor is optimistic, we argue that the successor is less likely to take a big bath. Alternatively, consider the case where the predecessor is optimistic. If the successor is rational, we would again expect to see a big bath, presumably even at a larger scale as the predecessor might have inflated asset values due to his upwardly biased beliefs. If the incoming CEOs are also optimistic, we

[18] 1,931 CEOs meet all required criteria, thereof 1,391 (72.04 percent) are classified as rational and 540 (27.96 percent) are classified as optimistic.

[19] Over time, the portion of CEOs classified as optimistic and those classified as rational is relatively stable.

[20] However, looking at the former CEOs for which we know the type, we find that 80 percent of them are rational and 20 percent optimistic. This is broadly in line with the proportions of our overall classification.

again expect no or at least less big bath behavior than if the incoming CEOs are rational. Thus, in both cases we expect optimistic incoming CEOs to be less likely to take a big bath than rational incoming CEOs.

Overall we have 4,378 firm-year observations (398 CEO turnovers * 11 years). Table 1 shows the descriptive statistics of our sample. -1.2 percent of total assets are on average written off in form of special items *(SPI)*. 26 percent of all firms have more than one percent depreciation in the form of special items *(Big Bath)*. The average return on assets *(ROA)* is 10.8 percent, companies have average total assets *(TA)* of about 5.3 billion dollars and the average leverage ratio *(Leverage)* is 19.5 percent. The ratio of cash bonus to total cash salary *(Bonus)* has a mean of 39.2 percent. The average market-to-book ratio *(MTB)* is approximately two.

[Insert Table 1 around here]

Pearson and Spearman correlations are shown in Table 2. The CEO optimism proxy is not included in the correlation table as it is only available for the time period of the incoming CEO, while the other variables are given for the entire -5/+5 year period surrounding the CEO turnover. Special items *(SPI)* are positively correlated with *ROA* and *Bonus* while *Big Bath* is negatively correlated with these two variables.

[Insert Table 2 around here]

Big Bath Accounting Model

The hypothesis is tested by estimating a logit model with big bath accounting as the dependent variable. Big bath accounting is a dummy variable which is equal to one if special items are less than minus one percent of total

assets. Optimistic is equal to one if the hired CEO is classified as optimistic and equal to zero if the hired CEO is classified as rational.

$$prob(SPI < -0.01) = logit(\beta_0 + \beta_1 * Optimistic + \gamma * controls') \quad (1)$$

4 Results

4.1 Univariate Results

Table 3 presents univariate results for our hypothesis. Firms with optimistic CEOs are significantly less likely to use big bath accounting in the year of the turnover. While big bath accounting is used in 41.5 percent of the turnovers with rational incoming CEOs, only 25.4 percent of the optimistic CEOs use big bath accounting. This is in line with our hypothesis (i.e., for optimistic managers the expected costs of big bath accounting seem to outweigh the perceived benefits). The univariate results show a significant difference in big bath accounting between optimistic and rational CEOs.[21]

Furthermore, in Table 3 we analyze how firms managed by optimistic CEOs differ from firms with rational CEOs in the year of the turnover. We find that firms managed by optimistic CEOs are smaller, have lower leverage ratios and better corporate governance than firms with rational CEOs. In our multivariate analysis below we include these company and manager characteristics in order to account for the heterogeneity of firms managed by rational and optimistic CEOs.

[Insert Table 3 around here]

[21] Big bath accounting occurred mainly in the last quarter of the respective fiscal year, supporting the argument that they were under the control of the incoming CEO.

Figure 1 graphically illustrates the univariate results presented in Table 3. Graph 1 shows the average ratio of write-offs in special items to total assets separately for firms with optimistic and rational CEOs. Firms with optimistic CEOs have fewer write-offs in the year of the turnover compared to those with rational CEOs. By classifying negative special items of more than minus one percent of total assets as big bath accounting, Graph 2 reveals that 16 percent more firms engage in big bath accounting when the incoming CEO is rational than when the incoming CEO is optimistic. Overall, the evidence in Figure 1 is consistent with our hypothesis that firms that hire optimistic CEOs are less likely to engage in big bath accounting.[22]

[Insert Figure 1 around here]

Routine vs. Non-Routine Turnover

Whether a CEO change is routine or non-routine seems to be an important determinant in the decision to engage in big bath accounting (Pourciau (1993); Wells (2002)). In order to rule out that our findings are a result of rational CEOs being mainly the successor in non-routine turnover and optimistic CEOs being mainly the successor in routine turnover, we separately investigate big bath accounting for routine and non-routine changes. Graph 1 of Figure 2 distinguishes between routine and non-routine management changes. Consistent with Pourciau (1993) and Wells (2002) we find that big bath accounting is more frequent after non-routine turnover (first graph). In the second graph we plot the proportion of firms engaging in big bath accounting for incoming optimistic and rational CEOs only after routine CEO turnover. Although we are only looking at routine changes, we still observe the same pattern as in graph 1 and 2, suggesting that the difference between optimistic and rational CEOs

[22] We already observe an increase in special items in the year preceding the turnover. This finding is consistent with Pourciau (1993).

is not driven by whether a management change is routine or non-routine.[23] Overall, Figure 2 indicates that the difference between optimistic and rational CEOs is not driven by whether a management change is routine or non-routine.

[Insert Figure 2 around here]

Justified vs. Unjustified Big Bath Accounting

The large write-offs that we classify as big bath accounting might be justified by poor firm performance preceding the CEO turnover. To mitigate concerns that our results are driven by differences in inherent big bath accounting potential, we compare the firm performance (i.e., return on assets *(ROA)* and stock market performance) before the turnover year for firms that hire optimistic CEOs with those that hire rational CEOs. Furthermore, the use of large write-offs in prior years could limit the big bath accounting potential in the turnover year. Therefore, we additionally compare the use of large write-offs prior to the turnover year for both types of firms. In unreported results, we find that firms that hire a rational CEO perform similarly prior to the turnover year compared to firms that hire an optimistic CEO. Furthermore, there is no significant difference in the use of large write-offs prior to the turnover. Consequently, both types of firms possess a similar big bath accounting potential in the year of the turnover.

Next, we investigate whether incoming optimistic CEOs fail to execute a justified big bath in the turnover year. If poor firm performance asks for large write-offs and the incoming CEO fails to undertake them, then the necessary restructuring is only postponed and should ultimately materialize in subsequent years. Thus, we should observe a significantly larger fraction of firms taking a big bath in future years given that justified write-offs are delayed in

[23] We do not show the corresponding graph with only non-routine changes because of data constraints. Only 12 CEO changes are non-routine where the incoming CEO is classified as optimistic.

the turnover year. In unreported results we find that firms managed by optimistic CEOs are not significantly more likely to take a big bath in the years following the turnover than firms managed by rational CEOs. If anything, they are less likely to do so. This finding is also supported graphically by Figure 1.

In summary, our results are unlikely to be driven by either selection of rational CEOs into firms with more potential for justified large write-offs or by a failure of optimistic CEOs to exercise justified large write-offs in the turnover year. We further elaborate this point in a multivariate setting in the subsection *"Potential of Big Bath Accounting"*.

4.2 Multivariate Results

In our regressions we control for non-routine turnover events with an indicator variable that is equal to one if the turnover was *Non-Routine* (or forced) and zero otherwise. In addition, we control for *ROA*, *Size*, *Leverage*, *MTB*, corporate governance mechanisms (*E-Index*), and the bonus compensation of the CEO (*Bonus*). The models include industry and time fixed effects when indicated. Standard errors are clustered at the firm level.

To test the hypothesis that firms with optimistic CEOs engage less often in big bath accounting, we estimate logit regressions with a dummy variable as the dependent variable that is equal to one if a firm has less than minus one percent of total assets written off in form of special items. The marginal effects in Table 4 represent the change in the probability of engaging in big bath accounting for a one-unit change in the respective control variable evaluated at the mean of all other control variables. We find support for the hypothesis that optimistic CEOs engage less in big bath accounting than rational CEOs. In all of our specifications, optimism of the new CEO is negatively related to big bath accounting. On average it is about 15 percent less likely that an

optimistic CEO will take a big bath, statistically significant at the one percent level. The effects of the control variables are in line with the findings of prior literature on big bath accounting. In particular, big bath accounting is more likely to occur when the turnover is non-routine. After a CEO has been fired or forced out, the new CEO will engage more often in large write-offs that can be attributed to the predecessor.

[Insert Table 4 around here]

Results so far indicate a strong difference in the use of special items between firms hiring optimistic CEOs and those hiring rational CEOs in the turnover year. However, Figure 1 also indicates a somewhat more pronounced use of special items by firms hiring rational CEOs in the remaining years. For this reason we next investigate whether there is generally a significant difference in big bath accounting between both types of firms or whether the turnover year is indeed crucial. Table 5 reports the 11 years surrounding the CEO turnover. Consistent with the existing literature we find that firms are more likely to take a big bath in the year of the turnover (*Year 0*). After controlling for relevant firm, year, and industry fixed effects, there is generally no significant big bath accounting behavior in other years. The interaction terms of *Optimistic* with the respective years confirm that incoming optimistic CEOs have a significantly lower big bath accounting likelihood in the turnover year compared to rational CEOs (*Year 0 x Optimistic*). The effect also spills over to the subsequent year to some extent (*Year 1 x Optimistic*). In all but one of the remaining years, the difference in big bath accounting behavior between firms with rational vs. optimistic incoming CEOs is statistically insignificant.

[Insert Table 5 around here]

4.3 Addressing Endogeneity

4.3.1 CEO Selection

There might be firm characteristics which could influence the firm's decisions to hire an optimistic CEO and simultaneously explain the predicted big bath accounting pattern. For example, it might be that past performance influences the decision to hire an optimistic manager and leads to abnormal levels of special items. Furthermore, in a theoretical model, de la Rosa (2011) shows that if incoming CEOs are optimistic they will accept a contract with a higher performance payment and a lower base payment than rational candidates.

We control for potential endogeneity by using a propensity score matching. In the first stage, we estimate a logit regression with a dummy as the dependent variable that is equal to one (zero) if the new manager is optimistic (rational). This gives us the conditional propensity of treatment (an optimistic manager) given certain observable covariates.

We control for CEO characteristics (*Age*, *Delta*, and *Vega*, see below) and firm characteristics (*Firm Age* and three year averages of *ROA*, *Special Items*, *Leverage*, and *Size* prior to the CEO turnover) and additionally for *Optimism* of the outgoing CEO.[24] Following Core and Guay (2002), we define *Delta* as the sensitivity of the CEO's stock and option portfolios with respect to changes in the value of the company's stock price and *Vega* as the sensitivity of the CEO's stock and option portfolio with respect to a change in the company's stock return volatility. Additionally, we include a dummy variable that is equal to one if the turnover was *Non-Routine*.[25] The unreported regression results

[24] With our optimism classification based on Malmendier and Tate (2005) we are able to identify only a limited number of outgoing managers. Therefore, optimism is measured analogue to Schrand and Zechman (2012) because every manager can be classified as either optimistic or rational. Managers are identified as optimistic if the dollar value of their exercisable options exceed the industry median based on two-digit SIC codes.

[25] The number of observations drops from 398 to 253 due to missing values for some variables.

suggest that firm size and the magnitude of incentive-based compensation have an impact on the decision to hire an optimistic CEO. Smaller firms and firms with stronger incentive-based compensation are more likely to hire optimistic CEOs.[26] The magnitude of special items prior to the turnover is not related to the decision to hire an optimistic manager. The behavioral type of the outgoing CEO does also not explain the type of the incoming CEO. This suggests that firms that hire optimistic CEOs do not generally favor this type of manager or that optimistic CEOs do not self-select into a special type of firms. To this extent, our PSM procedure also rules out that time-invariant unobservable firm characteristics drive the choice to hire a CEO of a certain behavioral type.[27]

In the second step, we match two firms which have the same propensity of hiring an optimistic CEO based on the logit regression of the first stage but where in fact one of the firms hired an optimistic CEO (treatment) and the other firm hired a rational CEO (control). We use the nearest neighbor matching method which matches two pairs with the lowest propensity score differences. We use a caliper of five percentage points which means that we do not match a treatment firm with a control firm if the difference in the propensity scores is larger than five percentage points. On the one hand, this restriction ensures that the matched pairs are similar across the observable variables. On the other hand, this reduces the number of matched pairs.

The results of the propensity score matched model in Table 6 confirm our previous results. Across all models optimistic managers are less likely to engage in big bath accounting. Firms with an optimistic incoming CEO are

[26] As a robustness test we also control for delta and vega in our baseline regression (i.e., whether firms hiring optimistic CEOs are less likely to engage in big bath accounting). The results remain unchanged when controlling for delta and vega. However, doing this reduces our sample size significantly due to missing information for some executives. Therefore, we do not include delta and vega in our main analysis.

[27] We acknowledge that there might also be time-variant unobservable factors that influence the choice to hire an optimistic CEO. However, conditioning on them is naturally impossible.

up to 20 percent less likely to engage in big bath accounting than firms with a rational incoming CEO.

[Insert Table 6 around here]

4.3.2 Potential of Big Bath Accounting

Another form of self-selection, which might affect our results, is the potential of big bath accounting. It might be that for some reasons optimistic (rational) managers self-select into firms with lower (higher) inherent big bath potential. To rule out that there are differences with respect to the possibility to engage in an earnings bath, we perform an additional propensity score matching. In the first stage we model the likelihood to take an earnings bath based on past and current performance as well as past special items. The rationale for this is that poor current and recent firm performance might yield more potential for big bath accounting (e.g., impairments) than if the company was performing well. To rule out that special items occurred in the former years we include special items as controls. Furthermore, it might be that big bath accounting is related to the size of the company since more visible firms behave differently with respect to earnings manipulation. We estimate the following model within all firm years of the Compustat Database.

$$\begin{aligned} Pr\left(SPI_t < -0.01\right) = logit(&\beta_0 + \beta_1 * ROA_t + \beta_2 * ROA_{t-1} \\ &+ \beta_3 * ROA_{t-2} + \beta_4 * ROA_{t-3} \\ &+ \beta_5 * SPI_{t-1} + \beta_6 * SPI_{t-2} \\ &+ \beta_7 * SPI_{t-3} + \beta_8 * Size_{t-1}) \end{aligned} \tag{2}$$

In untabulated results the first stage reveals that the current ROA is significantly negatively related and size is significantly positive related to big

bath accounting. Based on the first stage we generate matched pairs of firms with rational CEOs and firms with optimistic CEOs, which have the same propensity to engage in big bath accounting. We match each pair with the nearest neighbor without replacement and we use a caliper of five percentage points. The results in Table 7 show that our results are not affected by the matching design. Thus, our results are not driven by optimistic managers self-selecting into companies with lower inherent big bath potential.

[Insert Table 7 around here]

5 Robustness

5.1 Alternative Measures of Optimism

In this section, we investigate the sensitivity of our results to the chosen optimism classification parameters. Table 8 repeats our analyses of big bath accounting using alternative optimism classifications.

[Insert Table 8 around here]

We consider five alternatives to identify CEOs as optimistic or rational. Alternatives 1 and 2 follow our original procedure and classify CEOs as optimistic if they ever hold an option until the final maturity year, which is sufficiently deep in the money. Alternative 1 (2) thereby considers a moneyness of 20 percent (60 percent) as sufficient.

In alternative 3 we follow Sen and Tumarkin (2009) and classify CEOs as optimistic based on their holdings of company stock. This method follows the same rationale as the option based classification method. As executives typically have strong exposure to idiosyncratic risk, they should hold as little

of their company's stock as possible. However, according to Core and Larcker (2002), firms often require that their top executives hold a minimum of company stock. This requirement is often stated in terms of multiples of the executive's salary. If the executive holds more company stock than required by company constitutions, the executive is considered to be optimistic with respect to the future performance of the firm. Following Sen and Tumarkin (2009), we classify CEOs as optimistic when their holdings of company stock exceed the median of the ratio of stock holdings-to-salary.

In alternative 4, we investigate whether CEO optimism can be treated as a time-invariant personal characteristic of the CEO. In particular, we consider only observations on big bath accounting reported before the year in which the respective CEO was first classified as optimistic. If CEO optimism only manifests after this point in time, there should be no effect in prior periods.

Alternative 5 uses the classification based on Schrand and Zechman (2012). CEOs are classified as optimistic or rational based on the moneyness of their exercisable options. In particular, managers are identified as optimistic if the dollar value (measured as the difference between the current stock price and the average exercise price of the options times the number of options held) of their exercisable options exceeds the industry median based on two-digit SIC codes.[28]

Overall, our results are robust to alternative measures of optimism. Firms with CEOs classified as optimistic are significantly less likely to engage in big bath accounting in the turnover year in all settings, independent of the classification method used.

[28] We further normalize the dollar value of exercisable options by total sales to avoid that mostly CEOs in large companies are classified as optimistic because large companies usually grant more options to their managers.

5.2 Alternative Big Bath Thresholds

This section tests the robustness of our results related to our hypothesis with respect to the measurement of big bath accounting. Table 9 replicates the regressions of Table 4 with different classification thresholds for big bath accounting. In particular, model (1) defines big bath accounting as negative special items, model (2) as special items over total assets less than minus 0.5 percent, model (3) as less than minus one percent, model (4) as less than minus 1.5 percent, and model (5) as less than minus two percent. The results suggest that our findings are not sensitive to the measurement of big bath accounting. Firms hiring an optimistic CEO rather than a rational CEO are less likely to engage in big bath accounting. The effect is statistically significant in all but the most stringent threshold (model 5). However, the lack of significance for this specification is likely to be due to the small number of observations classified as big bath.

[Insert Table 9 around here]

5.3 Impact of the CFO

Accounting policies are likely to be influenced not only by the CEO but also by the CFO of a company. For that reason, we additionally analyze our hypothesis in the setting of CFO turnover. We find no evidence that CFO optimism has the same influence on big bath accounting in the year of appointment as that of the CEO.[29] This could be due to two reasons: First, it could be that it is the CEO who shapes the accounting policy of a firm and the CFO is of minor importance in this respect. Second, we consider it unlikely that a new CFO will engage in big bath accounting because large write-offs would portray the current CEO in a bad light.

[29] It should be noted that we are only able to identify a small number of CFOs as optimistic or rational. This could limit the power of our empirical results in these tests.

6 Conclusion

There is a dark and a bright side of managerial overoptimism. So far the existing literature mostly focuses on the dark side and highlights circumstances in which overoptimism leads to excessive risk-taking or other harmful actions by the respective manager. In this paper, however, we argue that there is also a bright side of managerial overoptimism and this behavioral feature could be beneficial in certain situations. In particular, we investigate whether overly optimistic managers engage less in big bath accounting after their appointment. Incoming optimistic managers believe that their companies' projects will realize higher earnings in the future when managed by them. Consequently they feel less need to transfer current earnings to the future and are thus less likely to engage in big bath accounting. Rational managers, however, do not have this upwardly biased belief and are hence more susceptible to engage in a big bath earnings manipulation. As manipulating earnings is generally not in the interests of stakeholders, we consider overoptimism as a beneficial feature in this situation.

By analyzing a sample of 398 CEO turnovers, we find evidence that is consistent with this suspected accounting behavior. We find less big bath accounting in firms where the new CEO is overly optimistic. Our findings are robust to alternative optimism classifications, big bath accounting definitions, the endogenous choice of hiring an optimistic CEO, endogenous big bath potential, and to several alternative explanations of accounting behavior at the turnover time, such as the turnover type (routine vs. non-routine), managerial compensation, and corporate governance mechanisms.

Our results imply that managerial overoptimism cannot be deemed as harmful in general but needs to be considered in the overall context. We highlight a situation where rational managers manipulate earnings for their

private benefits, while overly optimistic managers see no need for such an activity.

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Appendix

A.1 Figures

Figure 1: Big Bath Accounting

This figure presents percentages of firms that engage in big bath accounting during the 11-year window around CEO turnover for rational vs. optimistic incoming managers. In Graph 1, we show the level of special items over total assets. Graph 2 shows the percentage of firms with special items over total assets less than minus one percent for incoming optimistic CEOs and incoming rational CEOs.

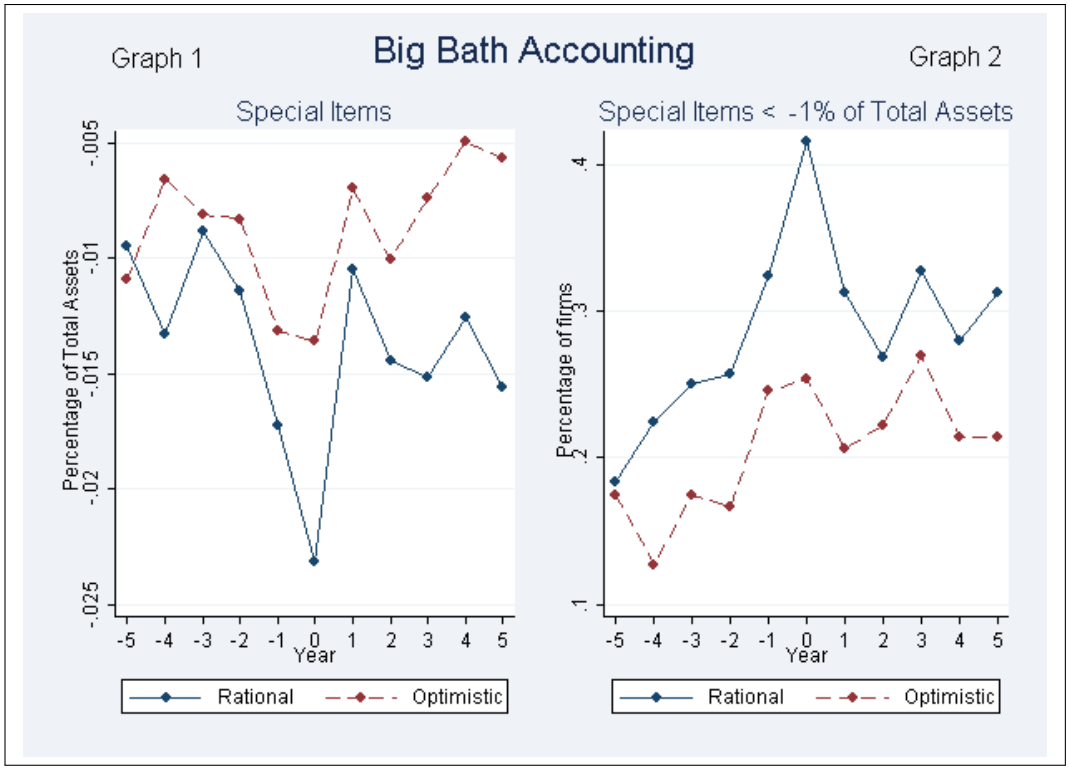
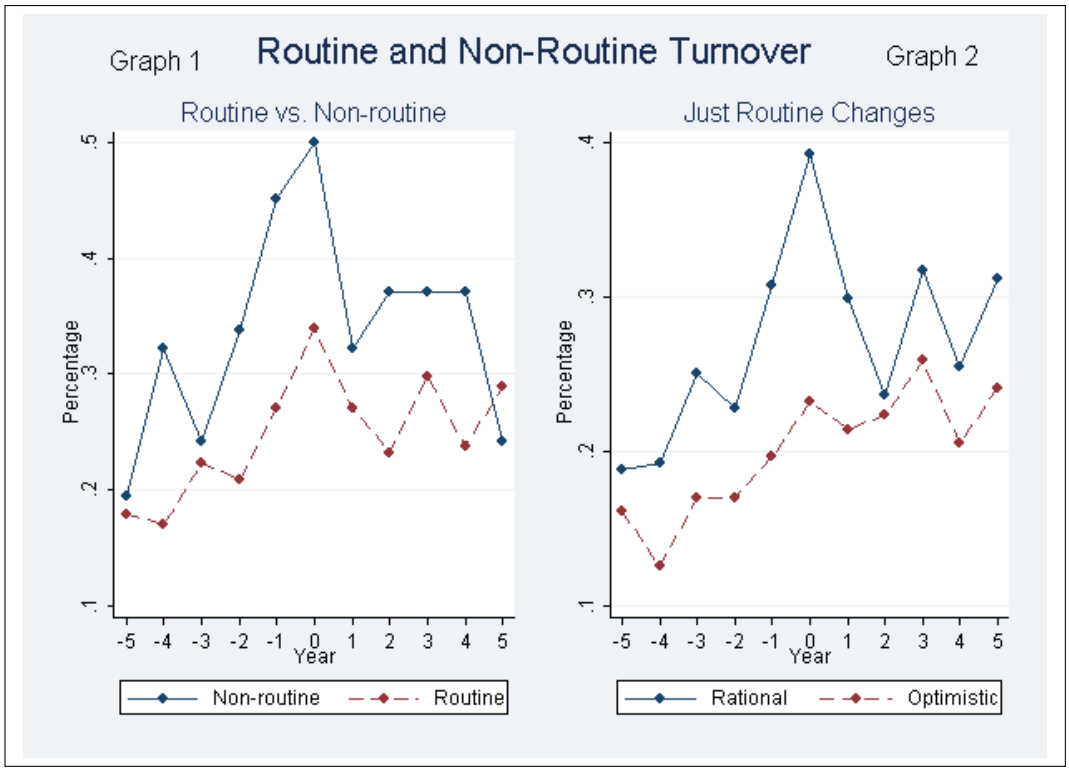


Figure 2: Routine and Non-Routine Turnover

This figure presents percentages of firms that engage in big bath accounting during the 11-year window around CEO turnover for non-routine vs. routine turnover (Graph 1) and for rational vs. optimistic incoming managers in routine turnover (Graph 2). Big bath accounting is defined as a dummy variable that equals one if special items over total assets are less than minus one percent.



A.2 Tables

Table 1: Descriptive Statistics

This table provides descriptive statistics for the 11 years around CEO turnover. The sample includes all firms in the ExecuComp database as of December 2010 with CEO turnover, for which the incoming CEO could be classified as optimistic or rational and stayed in the company for at least five years. All variables are defined in Table 10.

Variable	N	Mean	Sd	Min	P25	P50	P75	Max
SPI	4,378	-0.012	0.039	-0.225	-0.011	0.000	0.000	0.081
Big Bath	4,378	0.261	0.439	0.000	0.000	0.000	1.000	1.000
ROA	4,378	0.108	0.094	-0.258	0.061	0.104	0.156	0.406
TA	4,378	5.306	11.334	0.036	0.491	1.435	4.381	81.499
Size	4,378	0.428	1.587	-3.333	-0.712	0.361	1.477	4.401
Leverage	4,378	0.195	0.155	0.000	0.068	0.183	0.285	0.794
E-Index	4,378	2.475	1.123	0.000	2.000	3.000	3.000	6.000
Bonus	4,378	0.392	0.181	0.000	0.389	0.421	0.448	0.755
MTB	4,378	2.043	1.317	0.760	1.253	1.609	2.300	8.385

Table 2: Pearson and Spearman Correlations

This table provides Spearman correlations below the diagonal and Pearson correlations above the diagonal. All variables are defined in Table 10. ***/**/* indicate significance at the 1/5/10 percent level respectively.

Variable	SPI	Big Bath	ROA	Size	Leverage	E-Index	Bonus	MTB
SPI		-0.636***	0.156***	0.071***	0.003	0.004	0.081***	-0.042***
Big Bath	-0.787***		-0.127***	0.005	0.034**	-0.007	-0.096***	0.009
ROA	0.117***	-0.138***		0.089***	-0.127***	-0.065***	0.195***	0.409***
Size	0.000	0.003	0.023		0.196***	-0.003	0.140***	-0.104***
Leverage	-0.023	0.016	-0.195***	0.283***		0.041***	-0.022	-0.249***
E-Index	-0.001	-0.017	-0.045***	0.042***	0.069***		-0.051***	-0.107***
Bonus	0.073***	-0.086***	0.212***	0.181***	-0.008	-0.018		0.146***
MTB	0.017	-0.019	0.613***	-0.062***	-0.371***	-0.105***	0.186***	

Table 3: Univariate Results

This table provides mean values of accounting and firm characteristics in the year of the CEO turnover. The sample is divided into firms where the hired CEO is rational (Optimistic=0) or optimistic (Optimistic=1). All variables are defined in Table 10.

Variable	**N**	**Optimistic=0**	**Optimistic=1**	**P-Value**
SPI	398	-0.023	-0.014	0.06
Big Bath	398	0.415	0.254	0.00
ROA	398	0.086	0.119	0.00
TA	398	5.618	4.302	0.27
Size	398	0.480	0.335	0.39
Leverage	398	0.217	0.188	0.09
E-Index	398	2.375	2.504	0.28
Bonus	398	0.359	0.354	0.81
MTB	398	1.943	2.074	0.37

Table 4: Big Bath Regressions

This table provides marginal effects for logit regressions using big bath accounting as the dependent variable. *Big Bath* is defined as a dummy variable that equals one if special items over total assets are less than minus one percent in the turnover year. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO is classified as optimistic and zero otherwise. All variables are defined in Table 10. The regressions include industry and year dummies when indicated. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. ***/**/* indicate significance at the 1/5/10 percent levels respectively.

Dependent Variable	**Model 1** **Big Bath**	**Model 2** **Big Bath**	**Model 3** **Big Bath**
Optimistic	−0.161***	−0.154***	−0.149***
	(0.049)	(0.050)	(0.054)
Non-Routine		0.146**	0.114
		(0.069)	(0.084)
ROA			−0.681*
			(0.379)
Size			0.056***
			(0.019)
Leverage			0.256
			(0.185)
E-Index			−0.009
			(0.023)
Bonus			−0.643***
			(0.149)
MTB			0.042*
			(0.024)
Observations	398	398	393
Pseudo R^2	0.019	0.028	0.196
Year Fixed Effects	No	No	Yes
Industry Fixed Effects	No	No	Yes

Table 5: Big Bath Regressions - All Years

This table provides marginal effects for logit regressions using big bath accounting as the dependent variable. *Big Bath* is defined as a dummy variable that equals one if special items over total assets are less than minus one percent in the turnover year. The regressions include industry and year dummies as well as all control variables used in Table 4 when indicated. All variables are defined in Table 10. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. ***/**/* indicate significance at the 1/5/10 percent levels respectively.

Dependent Variable	**Model 1** **Big Bath**	**Model 2** **Big Bath**	**Model 3** **Big Bath**
Year -4	0.050	0.048	0.035
	(0.044)	(0.044)	(0.044)
Year -3	0.080**	0.073*	0.046
	(0.040)	(0.040)	(0.040)
Year -2	0.089**	0.078*	0.013
	(0.044)	(0.043)	(0.040)
Year -1	0.162***	0.143***	0.062
	(0.047)	(0.046)	(0.046)
Year 0	0.258***	0.198***	0.101*
	(0.049)	(0.050)	(0.052)
Year 1	0.150***	0.122***	0.009
	(0.046)	(0.045)	(0.044)
Year 2	0.101**	0.078*	−0.027
	(0.048)	(0.047)	(0.044)
Year 3	0.166***	0.137***	0.025
	(0.047)	(0.047)	(0.049)
Year 4	0.114**	0.082*	−0.014
	(0.046)	(0.045)	(0.047)
Year 5	0.150***	0.110**	−0.013
	(0.048)	(0.047)	(0.050)
Year -5 x Optimistic	−0.012	−0.001	0.007
	(0.052)	(0.053)	(0.053)
Year -4 x Optimistic	−0.110***	−0.105***	−0.103***
	(0.039)	(0.039)	(0.037)
Year -3 x Optimistic	−0.077*	−0.068	−0.055
	(0.041)	(0.043)	(0.043)
Year -2 x Optimistic	−0.091**	−0.080*	−0.063
	(0.039)	(0.041)	(0.041)
Year -1 x Optimistic	−0.066*	−0.050	−0.049
	(0.038)	(0.040)	(0.039)
Year 0 x Optimistic	−0.116***	−0.101***	−0.092***
	(0.030)	(0.031)	(0.030)
Year 1 x Optimistic	−0.092**	−0.084**	−0.074**
	(0.036)	(0.037)	(0.037)
Year 2 x Optimistic	−0.045	−0.038	−0.042
	(0.043)	(0.043)	(0.041)
Year 3 x Optimistic	−0.049	−0.039	−0.039
	(0.040)	(0.041)	(0.040)
Year 4 x Optimistic	−0.061	−0.048	−0.054
	(0.041)	(0.042)	(0.041)
Year 5 x Optimistic	−0.086**	−0.071*	−0.060
	(0.036)	(0.039)	(0.038)
Observations	4,378	4,378	4,378
Pseudo R^2	0.019	0.039	0.084
Control Variables	No	Yes	Yes

Table 5 – continued from previous page

Dependent Variable	Model 1 Big Bath	Model 2 Big Bath	Model 3 Big Bath
Year Fixed Effects	No	No	Yes
Industry Fixed Effects	No	No	Yes

Table 6: Big Bath Regressions - Matched on CEO Type

This table provides marginal effects for logit regressions using big bath accounting as the dependent variable of a propensity score matched model (PSM). *Big Bath* is defined as a dummy variable that equals one if special items over total assets are less than minus one percent in the turnover year. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO is classified as optimistic and zero otherwise. All variables are defined in Table 10. The regressions include industry and year dummies when indicated. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. ***/**/* indicate significance at the 1/5/10 percent levels respectively.

Dependent Variable	**Model 1 PSM Big Bath**	**Model 2 PSM Big Bath**	**Model 3 PSM Big Bath**
Optimistic	−0.157**	−0.161**	−0.202**
	(0.072)	(0.074)	(0.100)
Non-Routine		0.327***	0.398**
		(0.108)	(0.171)
ROA			−0.776
			(0.524)
Size			0.059
			(0.037)
Leverage			0.435
			(0.317)
E-Index			0.040
			(0.046)
Bonus			−0.784***
			(0.260)
MTB			0.071**
			(0.033)
Observations	166	166	153
Pseudo R^2	0.022	0.063	0.296
Year Fixed Effects	No	No	Yes
Industry Fixed Effects	No	No	Yes

Table 7: Big Bath Regressions - Matched on Big Bath Potential

This table provides marginal effects for logit regressions using big bath accounting as the dependent variable. *Big Bath* is defined as a dummy variable that equals one if special items over total assets are less than minus one percent in the turnover year. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO is classified as optimistic and zero otherwise. All variables are defined in Table 10. The regressions include industry and year dummies when indicated. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. ***/**/* indicates significance at the 1/5/10 percent levels respectively.

Dependent Variable	**Model 1** **PSM** **Big Bath**	**Model 2** **PSM** **Big Bath**	**Model 3** **PSM** **Big Bath**
Optimistic	−0.184***	−0.179***	−0.205***
	(0.062)	(0.062)	(0.079)
Non-routine		0.184*	0.200*
		(0.099)	(0.120)
ROA			−1.436**
			(0.544)
Size			0.093***
			(0.030)
Leverage			0.627***
			(0.215)
E-Index			−0.011
			(0.035)
Bonus			−0.649***
			(0.227)
MTB			0.092***
			(0.033)
Observations	228	228	208
Pseudo R^2	0.029	0.042	0.238
Year Fixed Effects	No	No	Yes
Industry Fixed Effects	No	No	Yes

Table 8: Big Bath Regressions - Alternative Optimism Classifications

This table provides marginal effects for logit regressions using big bath accounting as the dependent variable. *Big Bath* is defined as a dummy variable that equals one if special items over total assets are less than minus one percent in the turnover year. In Model 1, CEOs are classified as optimistic if they ever held an option until the final maturity year, which is at least 20 percent in the money. Model 2 uses the same classification method with a moneyness threshold of 60 percent. Model 3 classifies CEOs as optimistic if they held more company stock than required by company constitutions. Model 4 considers only big bath accounting that occurred before the year in which the CEOs were classified as optimistic, i.e., before they held an option until the final maturity year for the first time, which is at least 40 percent in the money. In Model 5, CEOs are identified as optimistic if the moneyness of their exercisable options exceeds the industry median based on two-digit SIC codes following Schrand and Zechman (2012). The regressions furthermore include all control variables used in Table 4. All variables are defined in Table 10. The regressions include industry and year dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. ***/**/* indicate significance at the 1/5/10 percent levels respectively.

Dependent Variable	**Model 1 Big Bath**	**Model 2 Big Bath**	**Model 3 Big Bath**	**Model 4 Big Bath**	**Model 5 Big Bath**
Optimistic (20)	−0.114**				
	(0.056)				
Optimistic (60)		−0.126**			
		(0.058)			
Voluntary Holder			−0.155***		
			(0.057)		
Pre-Longholder				−0.145***	
				(0.056)	
Optimistic (SZ)					−0.098*
					(0.054)
Observations	393	393	393	393	393
Pseudo R^2	0.190	0.191	0.194	0.194	0.189
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table 9: Big Bath Regressions - Alternative Big Bath Thresholds

This table provides marginal effects for logit regressions using big bath accounting as the dependent variable. *Big Bath* is defined as a dummy variable that equals one if special items over total assets are less than the specified threshold in each model in the turnover year. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO is classified as optimistic and zero otherwise. All variables are defined in Table 10. The regressions include industry and year dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms ***/**/* indicates significance at the 1/5/10 percent levels respectively.

Dependent Variable	**Model 1 <0.000 Big Bath**	**Model 2 <0.005 Big Bath**	**Model 3 <0.010 Big Bath**	**Model 4 <0.015 Big Bath**	**Model 5 <0.020 Big Bath**
Optimistic	−0.186***	−0.159***	−0.149***	−0.151***	−0.071
	(0.060)	(0.058)	(0.054)	(0.048)	(0.046)
Non-Routine	0.162**	0.091	0.114	0.038	0.024
	(0.077)	(0.086)	(0.084)	(0.072)	(0.060)
ROA	−0.262	−0.598	−0.681*	−0.684**	−0.723**
	(0.415)	(0.409)	(0.379)	(0.332)	(0.302)
Size	0.079***	0.063***	0.056***	0.045**	0.029*
	(0.021)	(0.021)	(0.019)	(0.018)	(0.016)
Leverage	0.338*	0.325	0.256	0.218	0.078
	(0.200)	(0.203)	(0.185)	(0.165)	(0.144)
E-Index	0.009	0.007	−0.009	−0.016	−0.015
	(0.026)	(0.025)	(0.023)	(0.021)	(0.019)
Bonus	−0.631***	−0.643***	−0.643***	−0.568***	−0.454***
	(0.154)	(0.156)	(0.149)	(0.135)	(0.116)
MTB	0.127	0.042	0.042*	0.025	0.032
	(0.027)	(0.026)	(0.024)	(0.022)	(0.021)
Observations	393	393	393	393	393
Pseudo R^2	0.172	0.184	0.196	0.183	0.155
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table 10: Variable Definitions

Variable Name	Definition
Big Bath Accounting:	
Special items (SPI)	Unusual or nonrecurring items in $millions.
Big Bath	A dummy variable that equals one if special items divided by total assets are less than minus one percent.
Managerial Characteristics:	
Optimistic	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 40% in-the-money and zero otherwise.
Optimistic (20)	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 20% in-the-money and zero otherwise.
Optimistic (60)	A dummy variable that equals one if a manager holds executive stock options until the last year of maturity that are at least 60% in-the-money and zero otherwise.
Pre-Longholder	A dummy variable that equals one in the time period before a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Optimistic (SZ)	A dummy variable that equals one if a managers holds executive stock options that are deeper in the money than the industry median based on two-digit SIC codes following Schrand and Zechman (2012).
Optimistic Predecessor (SZ)	A dummy variable that equals one if a Predecessor CEO holds executive stock options that are deeper in the money than the industry median based on two-digit SIC codes following Schrand and Zechman (2012).
Voluntary Holder	A dummy variable, which equals one if $\frac{Stock\ Holdings}{Salary} >= Median(\frac{Stock\ Holdings}{Salary})$ and zero otherwise, where: *Stock Holdings* is the value of company stock held by the CEO in $million. *Salary* is the CEO salary in $million.

Continued on next page

Table 10 – continued from previous page

Variable Name	Definition
Age_CEO	Age of the CEO in years.
Delta	Overall delta of the option and stock portfolio held by the CEO divided by total shares outstanding. The individual stock delta is one per definition, the delta of an individual option is defined as $e^{-dT}N(Z)$.
Vega	$e^{-dT}N^{'}(Z)ST^{1/2} * (0.01)$. In our regressions we use $log(1+vega)$ to correct for the skewness of vega. where: $Z = \left[ln\left(S/X\right) + T\left(r - d + \sigma^2/2\right)\right]/\sigma T^{1/2}$ $N =$ is the cumulative probability function for the normal distribution $N^{'}$ is the normal density function. S is the price of the underlying stock. X is the exercise price of the option. σ is the expected stock-return volatility over the life of the option. r is the natural logarithm of the risk-free rate. T is the time to maturity of the option in years. d is the natural logarithm of expected dividend yield over the life of the option.
Bonus	A manager's annual bonus payment divided by the sum of bonus and salary.
Turnover Characteristics:	
Non-Routine	Following Hazarika et al. (2012) a CEO turnover is classified as non-routine if (i) the CEO was fired, forced out from the position, or departed due to policy differences; or (ii) the departing CEO's age is less than 60, and the announcement does not report that the CEO died, left because of poor health, or accepted another position elsewhere or within the firm; or (iii) the CEO 'retires' but leaves the job within six months of the 'retirement announcement'.
Firm Characteristics:	
ROA	Return on assets (ROA) measured as EBIT divided by total assets.
TA	Total assets in $billion.

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Table 10 – continued from previous page

Variable Name	Definition
Size	Total assets in log $billion.
Leverage	Total debt divided by total assets.
E-Index	Bebchuk et al. (2009) Entrenchment index.
MTB	Market value of equity plus book value of debt divided by total assets.
Avg_SPI	Three year average of SPI prior to the CEO turnover.
Avg_ROA	Three year average of ROA prior to the CEO turnover.
Avg_Size	Three year average of Size prior to the CEO turnover.
Avg_Leverage	Three year average of SPI prior to the CEO turnover.
Age_Company	Age of the firm at the time of the CEO turnover.

General Appendix

A Optimism Classification

We classify executives as optimistic if they ever retain an option until one year before expiration even though the option was at minimum 40 percent in the money at the time. Before 2006, ExecuComp contained information on option holdings only in an aggregated form and not at the grant level. Thus, we use information on the granting and exercising of options in order to infer the option holdings at a grant level. Option grants are provided in detail in the ExecuComp tables STGRTTAB and PLANBASEDAWARDS. Option exercises are only given in an aggregated form in the table ANNCOMP. Thus, ExecuComp only states how many options were exercised but not from which option grant. Therefore, we follow Hall and Liebman (1998) and assume a first-in first-out (FIFO) allocation rule in order to infer the option holdings per year. However, similar to Hall and Liebman (1998) we encountered several problems in the construction of the option holding portfolios. In the following, we describe the treatment of the respective issues.

Missing Information for Option Grants.

For each option grant we need to know the number of options granted, the expiration date and the exercise price. Information on option grants is given in the ExecuComp tables STGRTTAB (for the years until 2006) and PLANBASEDAWARDS (for the years 2006 onwards). PLANBASEDAWARDS does not contain the expiration date of the grant but OUTSTANDINGAWARDS does and this can be added to the respective option grants. If the assignment of the exercise date was unclear, we assume that the options expire 10 years after the grant date as the median maturity for all option grants was 10 years. If the grant date was missing, we assume that the options were granted at fiscal

year end. If the exercise price was missing, we assume that the options were granted at the money and thus replaced missing exercise prices with the stock price of the company at the grant date as given by the ExecuComp variable "mktpric" or, if this variable is not available, with the CRSP stock price of the company at the grant date.

Inconsistencies in Granted Options between PLANBASEDAWARDS & STGRTTAB and ANNCOMP

We compare whether the number of options granted given in the detail tables (STGRTTAB and PLANBASEDAWARDS) coincides with the information given in the general annual compensation table (ANNCOMP). In about 95 percent of the cases the information is the same. For the remaining observations the difference almost exclusively arises because there is information on granted options in ANNCOMP without any information on the grant details in either STGRTTAB or PLANBASEDAWARDS. In these cases, we add the information by assuming that the options were granted in a single grant at the money at fiscal year end.

Gaps in Compensation Reporting

We check whether there are gaps in the compensation reporting in ExecuComp. If this is the case, we cannot track the exercise behavior of the executive and the construction of the annual option portfolios would be inaccurate. However, when there is only a one-year gap, the missing information can be added by comparing the option holdings of the previous and following years. When the number of options held was larger in the following year than in the previous year, we assume that the additional options were granted in a single grant at the money at fiscal year end of the missing year. When the number of options in the following year was smaller than in the previous year, we assume that the difference was exercised in the missing year. In this case

we apply the first-in first-out principle and assume that the oldest options were exercised first.

Initial Option Holdings

In order to apply the FIFO-algorithm, we need to know the executive's entire history of option grants and exercises. However, sometimes the executive held options of the company before the first information on an option grant was listed in ExecuComp. If this is the case, we follow Hall and Liebman (1998) and assume that these options were granted three years earlier and have seven years left until expiration, i.e., they were granted with a 10-year maturity. We further assume that the options were granted at the money at fiscal year end. To alleviate this problem, we again follow Hall and Liebman (1998) by tracking back option grants and exercises for ten years before constructing the first option holding portfolio. Since ExecuComp covers data since 1992, we construct the first option holding portfolio for the year 2002. If the executive still holds options before 1992, we impose the assumptions discussed above.

Inconsistencies in Option Holdings between FIFO-Algorithm & ANNCOMP

Sometimes the FIFO-algorithm resulted in a different number of options held by the executive than the number stated in the annual compensation table ANNCOMP. If this was the case, we follow Hall and Liebman (1998) and impose the following assumptions to the option holdings. When the number of options held by the executive given in ANNCOMP is smaller than the number produced by the FIFO-algorithm, we assume that either some exercises are missing in ExecuComp or that some options have expired. Therefore, we subtract the difference from the oldest option grants. When the number of options held given in ANNCOMP is larger than the number given by the FIFO-algorithm, we assume that too many options were exercised and add

back the exercised options until both numbers match. If adding back proved insufficient, the option holdings are rescaled proportionally such that they coincide with the number of options held given in ANNCOMP.

Adjustment for Stock Splits

The number of options held and the exercise price need to be adjusted for stock splits. We obtain information on stock splits directly from ExecuComp. When this information is missing we assume that there was no stock split in the given year.

Chance to Reveal Optimism

As discussed above, an executive needs to hold options until one year before expiration in order to be classified as optimistic. If ExecuComp does not cover this time period, no optimism can be identified. Therefore, we exclude all executives that had no chance to reveal themselves as being optimistic.

References

Hall, B. and J. Liebman (1998). Are CEOs really paid like bureaucrats? *Quarterly Journal of Economics 113*(3), 653–691.